TOWN OF LAKE PARK
SPECIAL CALL
HISTORIC PRESERVATION BOARD
MEETING AGENDA
JULY 10, 2023

6:30 P.M.
535 PARK AVENUE
LAKE PARK, FLORIDA

PLEASE TAKE NOTICE AND BE ADVISED: If any interested person desires to appeal any decision of the Historic Preservation Board with respect to any matter considered at the Meeting, such interested person will need a record of the proceedings, and for such purpose, may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based. *Persons with disabilities requiring accommodations in order to participate in the Meeting should contact the Town Clerk's Office by calling (561) 881-3311 at least 48 hours in advance to request accommodations.*

CALL TO ORDER

PLEDGE OF ALLEGIANCE

ROLL CALL

Richard Ahrens, Chair	□
Jon Buechele, Vice-Chair	□
Gustavo A. Rodriguez, Regular Member	□
Evelyn Harris Clark, Regular Member	□
Patricia J. Leduc, Regular Member	□

APPROVAL OF AGENDA

APPROVAL OF MINUTES

- HISTORIC PRESERVATION BOARD MEETING MINUTES; NOVEMBER 7, 2022

PUBLIC COMMENTS

Any person wishing to speak on an agenda item is asked to complete a Public Comment Card located in the rear of the Commission Chambers, and provide it to the Recording Secretary. Cards must be submitted before the agenda item is discussed.

ORDER OF BUSINESS

The normal order of business for Hearings on agenda items is as follows:

- Staff presentation
- Applicant presentation (when applicable)
- Board Member questions of Staff and Applicant
- Public Comments – 3 minute limit per speaker
- Rebuttal or closing arguments for quasi-judicial items
- Motion on floor
- Vote of Board

NEW BUSINESS

HPB 23-001 ***– AN APPLICATION FOR A CERTIFICATE OF APPROPRIATENESS FOR 535 PARK AVENUE FOR TOWN HALL PRESERVATION WORK, INCLUDING BALCONY RESTORATION/ROOF REPLACEMENT/PAINTING. OWNER/APPLICANT: ROBERTO F. TRAVIESO, PUBLIC WORKS DIRECTOR, TOWN OF LAKE PARK, FLORIDA***

COMMUNITY DEVELOPMENT DIRECTOR COMMENTS

BOARD COMMENTS

ADJOURNMENT

Town of Lake Park, Florida

Planning and Zoning Board Meeting Minutes

Monday, November 07, 2022 at 6:30 PM

535 Park Avenue Lake Park, Florida

Richard Ahrens	—	**Chair**
Jon Buechele	—	**Vice-Chair**
Lauren Paxton	—	**Regular Member**
Elizabeth Woolford	—	**Regular Member**

PLEASE TAKE NOTICE AND BE ADVISED, that if any interested person desires to appeal any decision of the Planning & Zoning Board, with respect to any matter considered at this meeting, such interested person will need a record of the proceedings, and for such purpose, may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based. Persons with disabilities requiring accommodations in order to participate in the meeting should contact the Town Clerk's office by calling 881-3311 at least 48 hours in advance to request accommodations.

CALL TO ORDER
6:48 P.M.

PLEDGE OF ALLEGIANCE

ROLL CALL

PRESENT:
Richard Ahrens
Jon Buechele
Lauren Paxton
Elizabeth Woolford

APPROVAL OF AGENDA:

Motion to approve the agenda made by Paxton, Seconded by Woolford.
Voting Yea: Ahrens, Buechele

APPROVAL OF MINUTES:

Motion to approve the September 12, 2022 Planning & Zoning Board Meeting Minutes made by Paxton,

Seconded by Woolford.

Voting Yea: Ahrens, Buechele

1. **Special Call Planning & Zoning Board Meeting; September 12, 2022**

PUBLIC COMMENTS ON AGENDA ITEMS:

Any person wishing to speak on an agenda item is asked to complete a Public Comment Card located on either side of the Commission Chambers, and provide it to the Recording Secretary. Cards must be submitted before the agenda item is discussed.
Chair Ahrens read the procedures to make Public Comments.

ORDER OF BUSINESS:

The normal order of business for Hearings on agenda items are as follows:
Staff presentation.
Applicant presentation (when applicable).
Board Member questions of staff and applicant.
Public Comments – limited to 3 minutes per speaker.
Rebuttal or closing arguments for quasi-judicial items.
Motion on floor.
Vote of Board.

NEW BUSINESS:

The Board reorder the agenda to hear PZ-22-17 first.

2. **PZ-22-17: PROPOSED ORDINANCE AMENDING THE TOWN'S EXISTING REGULATIONS FOR HOME OCCUPATIONS CONTAINED IN SECTION 78-151 OF THE ZONING CODE TO ESTABLISH REGULATIONS IN CONFORMANCE WITH FLORIDA STATUTES 559.995.**

Town Planner Karen Golonka made a presentation (see Exhibit "A"). Board Member Woolford asked if childcare be considered a Home Care Business. Town Planner Golonka explained that the Florida State Statute defined childcare separately. The Town's Code allows up to six (6) children. Chair Ahrens had no objections to what Town Planner Golonka presented. Vice-Chair Buechele asked if the Town would know who was applying for a Home Based Business through the Business Tax Receipt. Town Planner Golonka stated "yes" this would be how the Town would know of Home Base Businesses, otherwise they would be in violation of the Town Code.

Motion to approve the proposed Ordinance language was made by Buechele, Seconded by Woolford.

Voting Yea: Ahrens, Paxton

3. **PZ-22-16: PRESENTATION BY NUE URBAN CONCEPTS: TOWN OF LAKE PARK MOBILITY PLAN AND MOBILITY FEE.**

Mr. Jonathan Paul representing NUE Urban Concepts presented to the Board (see Exhibit "B"). Board Member Woolford asked if the pathways would be identified for bicyclists and pedestrians. Mr. Paul stated that markings could be placed identifying for walkways and a bicycle lane. Chair Ahrens expressed concerns with widening roads when structures are built right up to the property line. Mr. Paul explained that these proposed divided medians would only be done where there are currently four-lanes of traffic. He gave an example of 7th Street to US Highway 1 on Park Avenue as a roadway that could be divided with bicycle and pedestrian lanes. Chair Ahrens expressed concerns that this design would end at 7th Street because the roadway has been built out and did not see how this concept would work. Mr. Paul explained that there was a separate study being conducted to allow for this concept. He spoke of a possible round-about on 7th Street and Park Avenue to allow for the transition. Chair Ahrens expressed concern with sharing the road and sidewalk with bicyclists. Mr. Paul explained the next steps of the concept and putting the concept in place by 2045. Chair Ahrens raised concerns with the additional density in Town and how the concept would fit into the Town. Vice-Chair Buechele felt that if the Town modeled Clematis Street, people would drive slower, they would find places to park, and pedestrians would use the roadway more often. He was optimistic that the concept would work in Lake Park. Mr. Paul explained that there would be more input and design over the next 20-years. The Board discussed with Mr. Paul the concept and their concerns.

Chair Ahrens questioned the need for Mobility taxes and double taxation. Mr. Paul explained that there was a provision in the Palm Beach County Ordinance explaining taxes and reduction of their fee. It would be up to the Town Commission to adopt the fees. Mr. Paul explained that the fee, as it was currently constructed, would be in addition to the Palm Beach County Roadway Impact Fee. He explained that the Ordinance would come before the Town Commission on December 7, 2022 for discussion and input. The second reading of the Ordinance would take place on December 21, 2022 should the Town want to move forward.

Chair Ahrens felt that the fee would have a dramatic impact on the Town's projects. He suggested that the Town aggressively pursue Palm Beach County in keeping the fees in Town. He felt that the fees being proposed were a bad idea. Community Development Director DiTommaso explained that when the Town first began the process it was under the same mind frame as it related to the impact fees with Palm Beach County. She explained that the first iteration of the Comprehensive Plan changes aimed to create this program and replace the Palm Beach County

impact fee. As a result, Palm Beach County did not agree, and the plan was reverted back to follow the Palm Beach County impact fees. The Town has then begun the process to create a Mobility Plan and Mobility Fee of its own, structuring this plan with a fee schedule that accounts for the local roads and only 10% of Palm Beach County maintained roadways. The idea was for the Town to still go back to Palm Beach County and strategize that a portion of the impact fees that Palm Beach County receives to be spent on the County roadway projects that are identified in this plan. She explained that the Town was not there yet. However, the Town hopes to get there. She explained that the County does understand that the Town's Mobility Plan addresses County roadways and several projects are possibly within these County roadway areas. Chair Ahrens did not agree and made comments disagreeing with the taxes. Community Development Director DiTommaso stated that his comments would be shared with the Town Commission.

Vice-Chair Buechele asked what the issue was with City of Palm Beach Gardens and the County Mobility Fee. Mr. Paul explained that what the City of Palm Beach Gardens did was to adopt a full Mobility Fee and elected to no longer collect the County's fee. As a result Palm Beach County has been in litigation with the City of Palm Beach Gardens. Vice-Chair Buechele stated that the Town was setting itself up for a similar battle with Palm Beach County. Mr. Paul explained that it was the reason why the Town was taking a different approach.

Board Member Woolford asked if the impact fee currently affects the project in development. Mr. Paul explained that none of the current projects are affected by the proposed impact fees. If the Ordinance were adopted, then the fees would impact any future projects. Board Member Paxton asked if the Ordinance could be reassessed next year and see what happens with the City of Palm Beach Gardens. Mr. Paul stated that the Town Commission could reassess at any point. Chair Ahrens expressed his concerns moving forward with the Mobility Fees.

4. PZ-22-15: COURTESY PRESENTATION BY THE VILLAGE OF NORTH PALM BEACH ON THEIR PROPOSED C-3 DISTRICT LAND DEVELOPMENT REGULATIONS.

Community Development Director DiTommaso requested that the item be postponed until the next meeting.

COMMUNITY DEVELOPMENT DIRECTOR COMMENTS AND PROJECT UPDATES:

Chair Ahrens asked for a status update on the Northlake Blvd and US 1 project. Community Development Director DiTommaso explained that the project was not ready to move forward. She stated that the developer does not have all the authorizations in place from all of the property owners.

Chair Ahrens asked for a status of the Oceana Coffee project. Community Development Director DiTommaso explained that they are in the first stages of their project. She stated that the project would take about 18-months to be completed.

Board Member Paxton asked about the tarp on the Town Hall roof and would that be coming before the Historic Preservation Board. Community Development. Director DiTommaso explained that she did not have all the details about the Town Hall roof. If a roofer were hired the project would come before the Historic Preservation Board for review.

PLANNING & ZONING BOARD MEMBER COMMENTS:

Board Members had no comments.

ADJOURNMENT:

Motion to adjourn was made by Buechele, Seconded by Paxton.

Voting Yea: Ahrens, Woolford

The meeting adjourned at 8:40 P.M.

FUTURE MEETING DATE: December 5, 2022 at 6:30 P.M.

ADJOURNMENT

There being no further business to come before the Planning and Zoning Board the meeting adjourned at 8:40 P.M.

Richard C. Ahrens

Richard Ahrens, Chair
Town of Lake Park Planning & Zoning Board

Vii Mendez

Town Clerk, Vivian Mendez, MMC

TOWN OF LAKE PARK FLORIDA
Town Seal
SEAL

Approved on this 6 of February, 2023

Exhibit "A"

TOWN OF LAKE PARK

PLANNING AND ZONING BOARD
Meeting Date: November 7, 2022
Agenda Item# PZ 22-17

DESCRIPTION: PUBLIC HEARING

PUBLIC HEARING TO CONSIDER A PROPOSED ORDINANCE AMENDING THE TOWN'S EXISTING REGULATIONS FOR HOME OCCUPATIONS CONTAINED IN SECTION 78-151 OF THE ZONING CODE TO ESTABLISH REGULATIONS IN CONFORMANCE WITH FLORIDA STATUTES 559.995.

AN ORDINANCE OF THE TOWN COMMISSION OF THE TOWN OF LAKE PARK, FLORIDA, AMENDING CHAPTER 78, ARTICLE V OF THE TOWN OF LAKE PARK'S CODE OF ORDINANCES BY REPEALING SECTION 78-151, ENTITLED "HOME OCCUPATIONS" AND REPLACING IT WITH A NEW SECTION 78-151 ENTITLED "HOME-BASED BUSINESSES"; PROVIDING FOR THE AMENDMENT OF TABLE 78-1 CONTAINED IN CHAPTER 78, ARTICLE III, SECTION 78-70 AND SECTION 78-78 OF THE TOWN OF LAKE PARK'S CODE OF ORDINANCES TO DELETE THE TERM HOME OCCUPATIONS AND REPLACING IT WITH THE TERM HOME-BASED BUSINESSES; PROVIDING FOR CODIFICATION; PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

Background

In 2021 the Florida Legislature adopted legislation affecting a local government's ability to regulate home occupations. This is codified as FS section "559.955 Home-based businesses; local government restrictions". (See **Attachment A** for statute)

In summary, State law now prohibits local governments from regulating or restricting home-based businesses any different from other businesses in the local government's jurisdiction, except as provided in the legislation. The legislation does include certain performance standards for neighborhood compatibility.

Review of new ordinances adopted to address the legislation indicates that many communities are basically replacing their current language with that from the state statute itself. This includes West Palm Beach and Palm Beach Gardens. North Palm Beach has not yet amended its code.

The Town's ordinance, as proposed, would also basically utilize the state language, with minor additions to reflect Town ordinances. The current code section (Attachment C) would be repealed and replaced with the new text shown in **Attachment B.**

The ordinance also contains amendments to two zoning districts to replace the term "home occupation" with "home-based business" for consistency with state statute.

Analysis

Major Differences between current code and proposed language

The major differences between the Town's existing regulations and those mandated by the state are listed below.

Regulation Subject	Town's Current Code	Proposed Code (per State Statute)
Uses	No retail sales, specific uses listed as prohibited	No prohibition on uses. However residential character must be maintained.
Restriction on Employees	Must reside in home	Resident + up to two non-residents
Maximum area of residence to be used	10 %	No set limitation. However must be secondary to the residential use
Signage	None, unless required by state licensing law and maximum of 24 square inches	Per local code - Therefore, Town current restriction will carry forward.
	See attachment C for current Code	**See attachment B for proposed code**

Protections for the Neighborhood

While the State clearly opened the door to a number of new types of home businesses, the legislation did include some safeguards for residential neighborhoods. This statutory language is shown below in *blue italics.*

1. Residential Appearance

The following section of the statute can be broadly construed to protect residential neighborhood appearance, by requiring the following:

"As viewed from the street, the use of the residential property is consistent with the uses of the residential areas that surround the property. External modifications made to a residential dwelling to accommodate a home-based business must

conform to the residential character and architectural aesthetics of the neighborhood."

"The home-based business may not conduct retail transactions at a structure other than the residential dwelling"

This statutory language, included in the Town's proposed ordinance will serve as a major safeguard, insuring the continuing appearance of a residential neighborhood. In addition to retail transactions, the Town has added service transactions as well.

2. Parking

The Town's ability to control the type of uses that are allowed depends to a large degree on parking. The legislation states, "... *the need for parking generated by the business may not be greater in volume than would normally be expected at a similar residence where no business is conducted."*

Existing Town ordinances relating to parking in driveways and requiring hard surfaces for parking will serve to prohibit customers from parking on the grass. However, unless prohibited by Town Code or quantified, on-street parking would be enforced by making a determination that the volume of vehicles was exceeding what *"would normally be expected at a similar residence where no business is conducted."*

3. Trucks

The legislation states

"Local governments may regulate the use of vehicles or trailers operated or parked at the business or on a street right-of-way, provided that such regulations are not more stringent than those for a residence where no business is conducted. ..... Local governments may regulate the parking or storage of heavy equipment at the business which is visible from the street or neighboring property. For purposes of this paragraph, the term heavy equipment means commercial, industrial, or agricultural vehicles, equipment, or machinery."

Therefore the Town will continue to enforce "Section 30-35 - Parking of commercial vehicles in residential districts" which dictates that:

> "*Commercial vehicles in residential districts— Parking conditions.* Commercial vehicles, with the exception of one taxicab, or high-capacity passenger van or work van, or standard vehicle with equipment or commercial signage as defined herein, shall not be parked, stored or left on any street, right-of-way, swale or alley or on any private property in any residential districts, except that commercial vehicles may be parked or stored in an enclosed garage on private property in a residence district when completely screened from public view."

4. Nuisances such as noise, odors etc.

The legislation allows the enforcement of local regulations in regards to noise, odors, etc. Sections 78-151 (C) 4. and 5. of the proposed code address this. (See attachment B.

Overall Impact on Town Neighborhoods

The above four sections in the statute provide the main tools to limit or prohibit certain uses that are not compatible with a residential neighborhood, and these have been included in the Town's proposed ordinance.

With the limitation on parking many of the uses that the Town currently prohibits would continue to be prohibited based on the parking volume they generate. Included for example would be uses such as restaurants and grocery stores, and high volume retail.

Certain uses that are currently prohibited such as hair salons and barber shops could occur, with limited customers or appointment only. Retail uses such as a bakery or pick up orders deli might also occur.

The requirement that business must be within the residence will eliminate uses that would negatively impact a neighborhood.

The legislation does not supersede any current condominium declaration or any future declaration of condominium adopted pursuant to chapter 718

While it is not anticipated that there will be a large volume of requests for the new types of uses that will be allowable, the possibility that some businesses will not adhere to all the regulations exists and may require greater vigilance for code enforcement.

While an impingement on home rule, the Town has no option but to comply with the State Statute. The proposed ordinance will accomplish that.

The Town currently requires home businesses to have a business tax receipt from the Town, and this will continue.

Staff recommends approval of the proposed ordinance.

Attachments:
a. State Statute
b. Proposed Amendments
c.. Current Town Regulations

Attachment A - State Statute on Home-based Businesses

559.955 Home-based businesses; local government restrictions.—

(1) Local governments may not enact or enforce any ordinance, regulation, or policy or take any action to license or otherwise regulate a home-based business in violation of this section.

(2) A home-based business that operates from a residential property as provided in subsection (3):

(a) May operate in an area zoned for residential use.

(b) May not be prohibited, restricted, regulated, or licensed in a manner that is different from other businesses in a local government's jurisdiction, except as otherwise provided in this section.

(c) Is only subject to applicable business taxes under chapter 205 in the county and municipality in which the home-based business is located.

(3) For purposes of this section, a business is considered a home-based business if it operates, in whole or in part, from a residential property and meets the following criteria:

(a) The employees of the business who work at the residential dwelling must also reside in the residential dwelling, except that up to a total of two employees or independent contractors who do not reside at the residential dwelling may work at the business. The business may have additional remote employees that do not work at the residential dwelling.

(b) Parking related to the business activities of the home-based business complies with local zoning requirements and the need for parking generated by the business may not be greater in volume than would normally be expected at a similar residence where no business is conducted. Local governments may regulate the use of vehicles or trailers operated or parked at the business or on a street right-of-way, provided that such regulations are not more stringent than those for a residence where no business is conducted. Vehicles and trailers used in connection with the business must be parked in legal parking spaces that are not located within the right-of-way, on or over a sidewalk, or on any unimproved surfaces at the residence. Local governments may regulate the parking or storage of heavy equipment at the business which is visible from the street or neighboring property. For purposes of this paragraph, the term "heavy equipment" means commercial, industrial, or agricultural vehicles, equipment, or machinery.

(c) As viewed from the street, the use of the residential property is consistent with the uses of the residential areas that surround the property. External modifications made to a residential dwelling to accommodate a home-based business must conform to the residential character and architectural aesthetics of the neighborhood. The home-based business may not conduct retail transactions at a structure other than the residential dwelling; however, incidental business uses and activities may be conducted at the residential property.

(d) The activities of the home-based business are secondary to the property's use as a residential dwelling.

(e) The business activities comply with any relevant local or state regulations with respect to signage and equipment or processes that create noise, vibration, heat, smoke, dust, glare, fumes, or noxious odors. Any local regulations on a business with respect to noise, vibration, heat, smoke, dust, glare, fumes, or noxious odors may not be more stringent than those that apply to a residence where no business is conducted.

(f) All business activities comply with any relevant local, state, and federal regulations with respect to the use, storage, or disposal of any corrosive, combustible, or other hazardous or flammable materials or liquids. Any local regulations on a business with respect to the use, storage, or disposal of any corrosive, combustible, or other hazardous or flammable materials or liquids may not be more stringent than those that apply to a residence where no business is conducted.

(4) Any adversely affected current or prospective home-based business owner may challenge any local government action in violation of this section. The prevailing party in a challenge may recover reasonable attorney fees and costs incurred in challenging or defending the action, including reasonable appellate attorney fees and costs.

(5) The application of this section does not supersede:

(a) Any current or future declaration or declaration of condominium adopted pursuant to chapter 718, cooperative document adopted pursuant to chapter 719, or declaration or declaration of covenant adopted pursuant to chapter 720.

(b) Local laws, ordinances, or regulations related to transient public lodging establishments, as defined in s. 509.013(4)(a)1., that are not otherwise preempted under chapter 509.

History.—s. 1, ch. 2021-202.

Attachment B -Proposed Amendments to Town Code section 78-51

Sec. 78-151. – Home- based business

(a) Definition/ Intent

Home-based businesses are businesses that operate in whole or in part from an improved residential property. It is the intent of this section to provide minimum standards for home-based businesses in order to ensure compatibility with surrounding land uses and consistency with Section 559.955, Florida Statutes.

(b) Applicability

Home-based businesses shall be conducted in accordance with these standards. Community Residential Homes and Family Day Care Homes as defined by Florida Statutes shall be permitted in residential zoning districts in accordance with applicable statutes and are not subject to the requirements of this section.

(c) STANDARDS FOR HOME-BASED BUSINESSES

1. Employees of the business who work at the residential dwelling must also reside in the residential dwelling, except that up to a total of two employees or independent contractors who do not reside at the residential dwelling may work at the business. The business may have additional remote employees that do not work at the residential dwelling.
2. The activities of the home-based business shall be secondary to the property's use as a residential dwelling. The home-based business may not conduct retail or service transactions at a structure other than the residential dwelling; however, incidental business uses and activities may be conducted at the residential property in accordance with this section.
3. As viewed from the street, the use of the residential property shall be consistent with the uses of the residential areas that surround the property and there shall be no external evidence of activities of a home based business.

External modifications made to a residential dwelling to accommodate a home- based business shall conform with the residential character and architectural aesthetics of the neighborhood.

There shall be no external advertising, external display of goods, or any other external evidence of any home-based business, except for non-illuminated signage not to exceed 24 inches of total area affixed to the front of the resident's building

4. No substances or materials shall be stored or used except as they would, in such quantity, be normal and acceptable in a residential setting. All business activities shall comply with any relevant local, state, and federal regulations with respect to the use, storage, and disposal of any corrosive, combustible, or other hazardous or flammable materials or liquids.
5. Such occupation shall not result in any continuous, intermittent, pulsating or other noise or vibration that can be detected by a normal person off the premises. The business activities shall comply with the Town's Land Development Code and Code of Ordinances with respect to equipment or processes that create noise, vibration, heat, smoke, dust, glare, fumes, or noxious odors.
6. Parking related to the business activities of the home-based business shall comply with the general parking requirements within the Land Development Code and the need for parking generated by the business may not be greater in volume than would normally be expected at a similar residence where no business is conducted.
7. Vehicles and trailers used in connection with the business must be parked in legal parking spaces that are not located within the right-of-way, on or over a sidewalk, or on any unimproved surfaces at the residence. Commercial vehicles associated with a home based business shall only be permitted in conformance with requirements of "Section 30-35 - Parking of commercial vehicles in residential districts".

8. Town Business Tax Receipt Required: Prior to opening any home-based business, a Town Business Tax Receipt must be applied for and approved by the Community Development Department.

Attachment C - Current Code

Sec. 78-151. - Home occupations.

(a)*Definition, use limitations.* As used in this section, the term "home occupations" shall mean a business, profession, or trade conducted for gain or support entirely within a main residential building subject to the following use limitations:

(1)No outside help shall be used for purpose of engaging in such home occupation.

(2)No commodities except those incidental to said home occupation shall be sold or displayed on the premises.

(3)No chemical, electrical or mechanical equipment shall be used except that which is normally used for purely domestic or household purposes.

(4)No external evidence or sign that the dwelling is being used for the home occupation shall be allowed, except as required by state licensing law and no such sign shall exceed 24 square inches of the total area, nor shall said sign be illuminated, and said sign shall be affixed to the front of the resident's building.

(5)The activity involved shall not noticeably detract from the outward residential character of the neighborhood.

(6)There shall not be any type of public nuisance as a result of this minor business activity on the resident's property.

(7)Any equipment shall be stored inside an enclosed shelter, shed or garage.

(8)There shall be no vehicles over the size of a pickup truck or van parked at the residence.

(9)No personal physical service shall be performed unless licensed by the state.

(10)The area devoted to the home occupation shall not be the dominant use and in no case shall the area exceed ten percent of the total square footage of building area.

(11)Audible evidence of the activity should not be present off the real property line before 9:00 a.m. or after 10:00 p.m.

(b)*Particular home occupations permitted:* Customary home occupations include, but are not limited to, the following list of occupations, provided, however, that each listed occupation is subject to the requirements of subsection (a) of this section:

(1)Dressmakers, seamstresses, and tailors.

(2)Music teachers and tutors, provided that instruction shall be limited to not more than five pupils at a time.

(3)Drama instructors, provided that instruction shall be limited to not more than five pupils at one time.

(4)Artists, sculptors, and authors or composers.

(5)Offices for architects, engineers, lawyers, real estate brokers, insurance agents, and stock brokers.

(6)Ministers, rabbis, and priests.

(7)Offices for sales representatives, when no exchange of tangible goods is made on the premises and where business is primarily conducted on telephone lines.

(8)Day care centers or babysitters caring for not more than five unrelated children.

(c)*Particular home occupations prohibited:* Permitted home occupations shall not in any event include the following:

(1)Funeral homes.

(2)Nursery schools, unless specifically permitted by the town regulations.

(3)Restaurants.

(4)Small grocery stores.

(5)Stables or kennels.

(6)Tourist homes, unless specifically permitted by the town regulations.

(7)Renting of trailers or equipment.

(8)Animal kennels or hospitals.

(9)Auto and other vehicle repair.

(10)Barbershops and beauty parlors.

(11)Services such as small appliance, radio and television repair.

(Ord. No. 14-1987, § 1, 9-16-1987; Ord. No. 26-1990, § 8, 10-31-1990; Code 1978, § 32-96)

ORDINANCE NO. _____-22

AN ORDINANCE OF THE TOWN COMMISSION OF THE TOWN OF LAKE PARK, FLORIDA, AMENDING CHAPTER 78, ARTICLE V OF THE TOWN OF LAKE PARK'S CODE OF ORDINANCES BY REPEALING SECTION 78-151, ENTITLED "HOME OCCUPATIONS" AND REPLACING IT WITH A NEW SECTION 78-151 ENTITLED "HOME-BASED BUSINESSES"; PROVIDING FOR THE AMENDMENT OF TABLE 78-1 CONTAINED IN CHAPTER 78, ARTICLE III, SECTION 78-70 AND SECTION 78-78 OF THE TOWN OF LAKE PARK'S CODE OF ORDINANCES TO DELETE THE TERM HOME OCCUPATIONS AND REPLACING IT WITH THE TERM HOME-BASED BUSINESSES; PROVIDING FOR CODIFICATION; PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

WHEREAS, the Town of Lake Park, Florida ("Town") is a duly constituted municipality having such power and authority conferred upon it by the Florida Constitution and Chapter 166, Florida Statutes; and

WHEREAS, the Town Commission has adopted regulations for home occupations which have been codified in Chapter 78, Article V under Section 78-151 of the Code of Ordinances of the Town of Lake Park (the Code); and

WHEREAS, the Florida Legislature enacted amendments to Section 559.955, Florida Statutes, which became effective on July 1, 2021, preempting local government's regulation of certain areas of the statute pertaining to home-based businesses; and

WHEREAS, the Town's Planning and Zoning Board has conducted a public hearing to review the proposed amendments to the Code and has provided a recommendation to the Town Commission; and

WHEREAS, the Town Commission, after its review of the recommendations from the Planning and Zoning Board, and after due notice and public hearings finds that it is appropriate and necessary to amend Chapter 78, Article V Section 78-151 of the Code so that it is consistent with general law; and

WHEREAS the Town Commission has determined it is appropriate to repeal, in its entirety section 78-151 and to adopt a new section 78-151;

NOW THEREFORE, BE IT RESOLVED BY THE TOWN COMMISSION OF THE TOWN OF LAKE PARK, FLORIDA:

Section 1. The whereas clauses are hereby incorporated as the legislative findings of the Town Commission.

Section 2. Chapter 78, Article V, Section 78-151 of the Code, entitled "Home Occupations " is hereby repealed in its entirety and shall be replaced with a new section 78-151 as set forth in **Exhibit A**, which is attached hereto and incorporated herein.

Section 3. Chapter 78, Article III, section 78-70, Table 78-1, "Additional Standards for Table 78-1, (3)" is amended as follows:

b. Live-work apartment units are permitted within the upper floors of a structure. The primary use shall remain residential and home-based businesses ~~home occupations~~ are permitted in conjunction with the residential use and pursuant to the town code provisions regulating home-based businesses.~~home occupations~~.

Section 4. Chapter 78, Article III, section 78-78, (e) Permitted uses is amended as follows:

(37) Home-based businesses ~~Home occupations.~~

Section 5. . **Codification.** The provisions of this ordinance shall become and be made a part of the Code of Ordinances of the Town of Lake Park. The sections of the ordinance may be re-numbered or re-lettered to accomplish such.

Section 6. Severability. If any section, paragraph, sentence, clause, phrase or word of this ordinance is for any reason held by a court to be unconstitutional, inoperative or void, such holding shall not affect the remainder of this ordinance

Section 7. Effective date. This ordinance shall take effect immediately

upon execution.

Exhibit A

Sec. 78-151. – Home- based business

(a) Definition/ Intent

Home-based businesses are businesses that operate in whole or in part from an improved residential property. It is the intent of this section to provide minimum standards for home-based businesses in order to ensure compatibility with surrounding land uses and consistency with Section 559.955, Florida Statutes.

(b) Applicability

Home-based businesses shall be conducted in accordance with these standards. Community Residential Homes and Family Day Care Homes as defined by Florida Statutes shall be permitted in residential zoning districts in accordance with applicable statutes and are not subject to the requirements of this section.

(c) STANDARDS FOR HOME-BASED BUSINESSES

1. Employees of the business who work at the residential dwelling must also reside in the residential dwelling, except that up to a total of two employees or independent contractors who do not reside at the residential dwelling may work at the business. The business may have additional remote employees that do not work at the residential dwelling.
2. The activities of the home-based business shall be secondary to the property's use as a residential dwelling. The home-based business may not conduct retail or service transactions at a structure other than the residential dwelling; however, incidental business uses and activities may be conducted at the residential property in accordance with this section.
3. As viewed from the street, the use of the residential property shall be consistent with the uses of the residential areas that surround the property and there shall be no external evidence of activities of a home based business.

External modifications made to a residential dwelling to accommodate a home- based business shall conform with the residential character and architectural aesthetics of the neighborhood.

There shall be no external advertising, external display of goods, or any other external evidence of any home-based business, except for non-illuminated signage not to exceed 24 inches of total area affixed to the front of the resident's building if required by law.

4. No substances or materials shall be stored or used except as they would, in such quantity, be normal and acceptable in a residential setting. All business activities shall comply with any relevant local, state, and federal regulations with respect to the use, storage, and disposal of any corrosive, combustible, or other hazardous or flammable materials or liquids.

5. Such occupation shall not result in any continuous, intermittent, pulsating or other noise or vibration that can be detected by a normal person off the premises. The business activities shall comply with the Town's Land Development Code and Code of Ordinances with respect to equipment or processes that create noise, vibration, heat, smoke, dust, glare, fumes, or noxious odors.

6. Parking related to the business activities of the home-based business shall comply with the general parking requirements within the Land Development Code and the need for parking generated by the business may not be greater in volume than would normally be expected at a similar residence where no business is conducted.

7. Vehicles and trailers used in connection with the business must be parked in legal parking spaces that are not located within the right-of-way, on or over a sidewalk, or on any unimproved surfaces at the residence. Commercial vehicles associated with a home based business shall only be permitted in conformance with requirements of "Section 30-35 - Parking of commercial vehicles in residential districts".

8. Prior to opening any home-based business, a Town Business Tax Receipt must be applied for and approved by the Community Development Department.

TOWN OF LAKE PARK:
NOTICE OF PROPOSED ZONING TEXT AMENDMENT

Please take Notice and be advised that the Town of Lake Park is proposing to amend its Code of Ordinances pertaining to **home occupations,** to allow for a greater range of uses subject to various performance standards to insure residential character is maintained. This amendments, proposed to be adopted by the ordinance below, are necessary to be consistent with State Statute 559.955 "Home-based businesses; local government restrictions".

ORDINANCE NO. _____-22

AN ORDINANCE OF THE TOWN COMMISSION OF THE TOWN OF LAKE PARK, FLORIDA, AMENDING CHAPTER 78, ARTICLE V OF THE TOWN OF LAKE PARK'S CODE OF ORDINANCES BY REPEALING SECTION 78-151, ENTITLED "HOME OCCUPATIONS" AND REPLACING IT WITH A NEW SECTION 78-151 ENTITLED "HOME-BASED BUSINESSES"; PROVIDING FOR THE AMENDMENT OF TABLE 78-1 CONTAINED IN CHAPTER 78, ARTICLE III, SECTION 78-70 AND SECTION 78-78 OF THE TOWN OF LAKE PARK'S CODE OF ORDINANCES TO DELETE THE TERM HOME OCCUPATIONS AND REPLACING IT WITH THE TERM HOME-BASED BUSINESSES; PROVIDING FOR CODIFICATION; PROVIDING FOR SEVERABILITY; AND PROVIDING FOR AN EFFECTIVE DATE.

TWO PUBLIC HEARINGS WILL BE HELD AS FOLLOWS:

LAKE PARK PLANNING AND ZONING BOARD

Monday, November 7, 2022, immediately following the Historic Resources Board meeting at 6:30 pm, or as soon thereafter as the matter can be heard.

LAKE PARK TOWN COMMISSION – First Reading

Wednesday, December 7, 2022 at 6:30 pm or as soon thereafter as the matter can be heard.

All Hearings will be held in the Town Commission Chambers, located in Town Hall, 535 Park Ave., Lake Park, FL 33403

BE ADVISED: ALL DATES ARE SUBJECT TO CHANGE. Please refer to the Town website and agendas for the most up to date items being presented or call 561-881-3320."

For additional information, or to review any documents related to the proposal described herein, please call the Community Development Department at 561-881-3320, ext. 325.

If a person decides to appeal any decision made by the Planning & Zoning Board or Town Commission with respect to the hearings, they will need a record of the proceedings and for such purpose may need to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based. For additional information, please contact Vivian Mendez, Town Clerk at 561-881-3311.

Vivian Mendez, Town Clerk

PUB Friday, October 28, 2022

Exhibit "B"

TOWN OF LAKE PARK

MOBILITY PLAN & MOBILITY FEE

OCTOBER 2022

NUE URBAN CONCEPTS
LAND USE · MOBILITY · PARKING · FEES

THE REPUBLIC OF DESIGN INC.

DDEC

futureplan

MOBILITY COHORT

Further Reading: A technical report is being prepared for documenting the mobility fee

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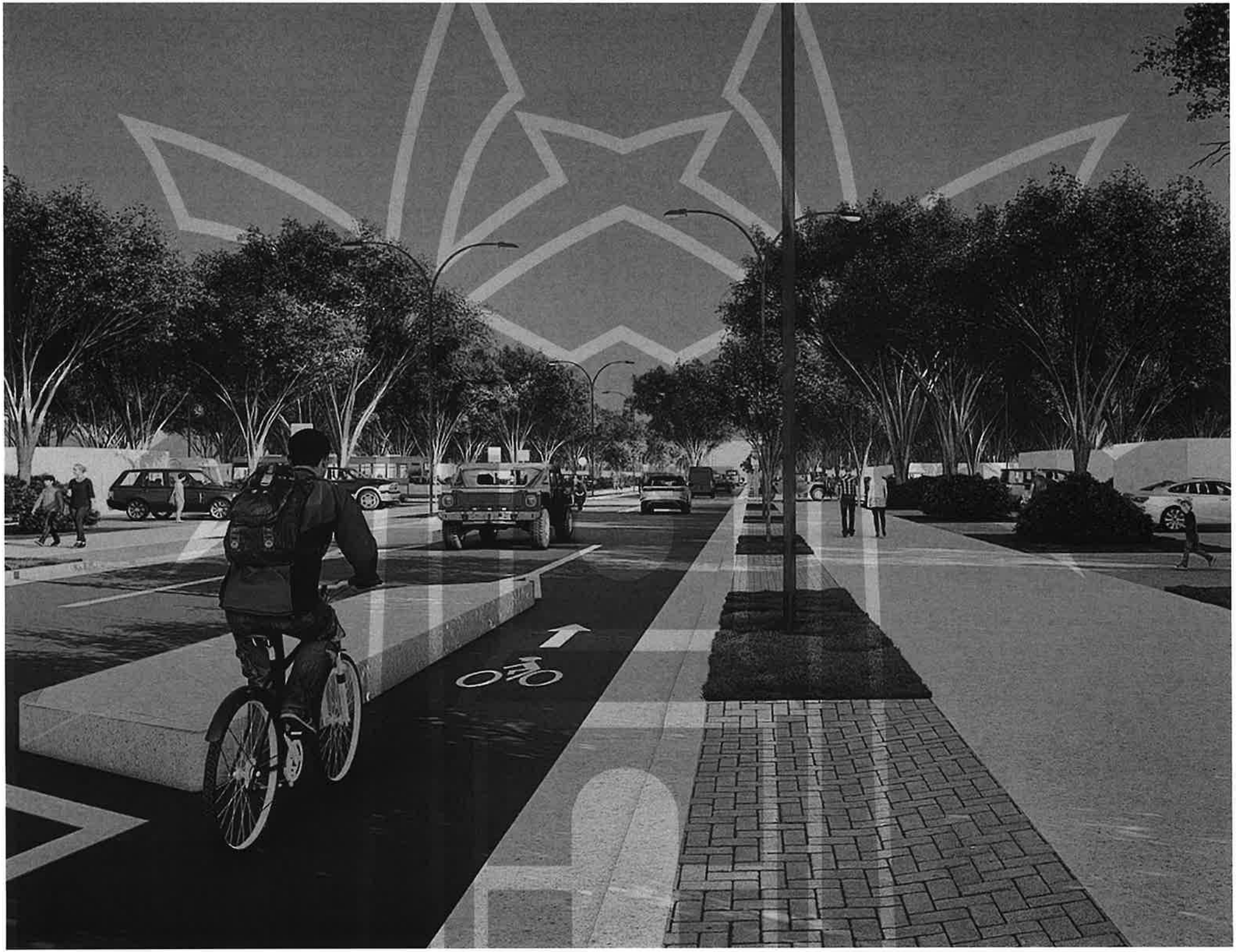

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INTRODUCTION

The City of Lake Park, once known as the "Gateway to the World's Winter Playground," was founded in 1923 by Harry Seymore Kelsey, a wealthy businessman who sold his multimillion-dollar restaurant business to join the Florida land boom and eventually become the largest landowner in Palm Beach County. Originally named Kelsey City, Lake Park was the first zoned municipality in the State of Florida and was intended to be a resort destination. During its time as a nationally recognized, groundbreaking town, the Town's founder commissioned the Olmsted Brothers company, owned and operated by the famous landscape architect Frederick Law Olmsted's sons, to design and landscape the community. Before it could reach its full potential, a combination of factors including a slowing real estate market, the devastating 1928 hurricane, and the Great Depression led to a halt in development for more than a decade. After World War II, the Town experienced an increase in population primarily made of military personnel that catalyzed reinvestment in the Town. Revitalization efforts by the local garden club led to the Town's name change aimed to honor the Town's Olmsted legacy by naming the street grid after flowers and other flora. Today, the Town's development still largely follows the original plan of development:

- Residential area from US Highway 1 to 5th St
- Commercial area from 5th to the FEC railroad
- Industrial area west of the railroad

With more than 9,000 residents, the Town boasts a historic downtown main street, beautiful landscaping and parks, a marina and waterfront promenade, the Kelsey Theater, and the historic Town Hall building listed on the National Register of Historic Places. The 2045 Mobility Plan brings together various City initiatives to enhance Lake Park's history and character as an Olmsted legacy by creating a vibrant, lush oasis. The plan seeks to further emphasize the historic Downtown as a place for people and improve mobility and accessibility for multimodal travel throughout the City.

The Mobility Plan serves as the basis for the establishment of a Mobility Fee system that functions as an alternative to transportation concurrency enacted by the Florida Legislature. The Mobility Fee allows new development and redevelopment to mitigate its transportation impact to Lake Park's transportation system through payment of a one-time fee.

The Town of Lake Park 2045 Mobility Plan is a vision, over the next 22 years, to emphasize the movement of people, versus moving cars. This is done by planning for multimodal transportation projects that provide people choices: whether they want to walk, bicycle, ride transit, use new mobility technology, or continue to drive their cars. The Mobility Plan also proposes innovative programs that will supplement multimodal projects and enhance access to businesses and services within Lake Park and reduce the impact of traffic on neighborhood streets.

The 2045 Mobility Plan consists of two (2) distinct plans: (1) Complete Streets Plan; (2) Streetscape, Street Trees, and Landscape Enhancement Plan. The two plans include sidewalks, complete streets, multimodal improvements (e.g., multi-use trails, shared-use paths, bicycle lanes, curbless shared streets), low speed streets, new roads, and enhanced streetscape, street trees, and landscaping. The Complete Streets Plan addresses both townwide and regional mobility by proposing upgrades to existing regional bus stops. The Plan also identifies several needs on FDOT, Palm Beach County, and neighboring municipality roads, which will require coordination with the relevant agencies.

The Town of Lake Park Mobility Plan and Mobility Fee Technical Report, dated September 2022, documents the data and methodology used to develop a mobility fee that meets legally established dual rational nexus and rough proportionality tests, along with the requirements of Florida Statutes 163.3180.

MOBILITY PLANNING

The Mobility Plan establishes a shared community vision for how people travel that is built on providing mobility choices.

WHAT IS A MOBILITY PLAN?

A Mobility Plan is a forward-looking and progressive approach that sets forth a comprehensive vision of a transportation system that emphasizes the movement of people over cars and provides people with the opportunity to safely, comfortably, and conveniently walk, bicycle, ride transit, drive or use new mobility technology to move around their towns or cities. An effective Mobility Plan identifies transportation improvements such as sidewalks, trails, bike/multimodal lanes (on-street) and multimodal ways (off-street), transit routes and stops, intersection improvements, traffic calming, and low speed streets that connect neighborhoods with important destinations. Mobility Plans may also identify strategic policies and programs that facilitate effective implementation of the proposed infrastructure projects.

In 2007, the Florida Legislature introduced the concept of Mobility Plans and Mobility Fees as an alternative to transportation concurrency and to provide an equitable way for new development to mitigate (offset) its impact to the transportation system.

In 2013, the Legislature updated the Community Planning Act to encourage and allow local governments to adopt alternative mobility funding systems, such as Mobility Plans and Mobility Fees, as a replacement for transportation concurrency, proportionate share, and road impact fees (Florida Statute 163.3180).

WHY DOES THE TOWN NEED A MOBILITY PLAN?

The Town of Lake Park is projected to experience significant population and employment growth that will add new homes, businesses, and shops to the community over the next 22 years. These new residents and businesses will generate additional traffic and increase the demand for multimodal transportation projects to travel within Lake Park and to and from surrounding cities, communities, and neighborhoods.

The Mobility Plan provides a blueprint for the Town of Lake Park to proactively prioritize multimodal projects. Mobility Plans are different from transportation concurrency and road impact fees because they emphasize addressing travel demand from new growth, not only through new roads and widening of existing roads, but also by providing diverse mobility choices. This approach helps local governments find a balance between reducing congestion and supporting community growth.

Identifying project needs and priorities in the Mobility Plan will help the Town of Lake Park take advantage of additional funding opportunities, such as federal and state assistance programs and grants. In coordination with the Palm Beach County Transportation Planning Agency (TPA), projects in Lake Park's Mobility Plan may also be identified for funding through inclusion in the region's Long Range Transportation Plan.

MOBILITY PLANNING

HOW WAS THE MOBILITY PLAN DEVELOPED?

In 2022, The Town of Lake Park contracted NUE Urban Concepts and DDEC, co-founding members of the Mobility Cohort, to lead in the development of a Mobility Plan and Mobility Fee that would transition Lake Park from a transportation planning and funding process primarily focused on moving cars to a multimodal system that emphasizes people and mobility choices. The development of the Mobility Plan was a collaborative process that brought together Town staff, business and property owners, and interested residents and it included leveraging local knowledge, an analysis of existing conditions, and coordination with current planning initiatives to develop a strategic plan that will best serve the residents and visitors of Lake Park.

The first step in the development of the Mobility Plan was to identify anticipated future developments and to review the Town's Comprehensive Plan and Capital Improvements Program for improvements that are planned and programmed, including the 10th Street & Park Avenue Landscape and Streetscape Plan and the extension of Park Avenue. The team then evaluated existing conditions and held meetings with stakeholders to gain local knowledge that informed the identification of additional projects to fill existing gaps and create a safe, convenient, and integrated transportation system.

The project team provided public information and implemented a communications strategy to promote the development of the Mobility Plan and Mobility Fee and invited residents to contribute their ideas. During the summer of 2022, the Town held two public meetings. The first introduced what a Mobility Plan and Mobility Fee is, presented the draft Mobility Plan, and provided an opportunity to discuss broad topics related to improving multimodal transportation in Lake Park. In the second meeting, the project team presented an updated version that incorporated resident feedback and discussed details of the calculation of the Mobility Fee.

Common themes that came out of the two public meetings included road safety and accessibility. Overall, the Mobility Plan received positive feedback, except for opposition to the proposed road openings on 2nd Street and 3rd Street at Silver Beach Road. Two memos that expand upon the feedback received in each public meeting were prepared and can be referenced in the Town of Lake Park 2045 Mobility Plan & Mobility Fee Technical Report. Input received at the public meetings was used to refine and finalize the project recommendations in the Mobility Plan.

A legal process is necessary to adopt and implement the Mobility Plan and Mobility Fee. The City established legislative intent to consider development of a mobility plan and fee through the 2022 amendment to the Comprehensive Plan. Once legislative intent was established, the Lake Park 2045 Mobility Plan and Mobility Fee was developed. Below is a step-by-step overview of the process used to develop the Mobility Plan and Mobility Fee consistent with legal and statutory requirements. After both are finalized through a community engagement process and the plan is given approval by the Planning & Zoning Board, the Town Commission must adopt an implementing ordinance. The implementing ordinance is followed by an administrative assessment and changes to the comprehensive plan, land development codes, and site access/impact assessment processes.

MOBILITY PLANNING

MOBILITY PLANNING IN LAKE PARK'S COMPREHENSIVE PLAN

In 2021, the Town of Lake Park amended the Transportation Element of its Comprehensive Plan to establish legislative intent to develop a Mobility Fee based on the multimodal projects established in a Mobility Plan.

GOAL 4.6.1 of the Transportation Element of Lake Park's Comprehensive Plan is:

"A safe, connected, convenient, and efficient multimodal transportation system that emphasizes the movement of people and goods in a sustainable manner and minimizes environmental and neighborhood impact shall be available to all residents, business, and visitors of the Town."

POLICY 2.1 of the Transportation Element of Lake Park's Comprehensive Plan is:

"The Town shall adopt a mobility plan that addresses impacts to Town, County, and State of Florida transportation facilities within and adjacent to the Town. The multimodal improvements identified in the Mobility Plan shall be based on future person travel demand and multimodal projects necessary to meet the demand as required by the needs test of the dual rational nexus test. The horizon year for the mobility plan shall be either consistent with the Town's Comprehensive Plan or the most recently adopted Palm Beach County TPA Long Range Transportation Plan (LRTP). The Mobility Plan may identify improvements that may be used in the calculation of a Mobility Fee, which may be wholly or partially attributable to new development, or redevelopment.

POLICY 2.3 of the Transportation Element of Lake Park's Comprehensive Plan is:

"The types of projects included in the Mobility Plan shall be consistent with multimodal quality of service standards established therein. At a minimum, the Mobility Plan shall include the identification of improvements for people walking, such as sidewalks and paths, bicycling, such as bike lanes or bike trails, people riding microtransit and transit vehicles, such as multimodal lanes, slow speed (15MPH) lanes, and dedicated lanes, and for people driving, such as upgraded intersections and wider roads, and low speed and shared curbless streets."

POLICY 2.5 of the Transportation Element of Lake Park's Comprehensive Plan is:

"The Town shall evaluate developing complete street policies identified in the Mobility Plan or into its land development regulations. These land development regulations would address the anticipated users of road, including pedestrians, bicyclists, transit, motorists. The land development regulations shall evaluate appropriate designs of roadway cross-sections based upon mobility and accessibility needs"

OBJECTIVE 3 of the Transportation Element of Lake Park's Comprehensive Plan is:

"The Mobility Plan may evaluate the adoption of a Mobility Fee to mitigate the travel demand of persons in and through the Town attributable to future development and redevelopment on the Town, County, and state of Florida roads identified in this Element."

MOBILITY FEES

WHAT IS A MOBILITY FEE?

A Mobility Fee is a one-time fee paid to the Town by development activity (e.g. new or expanded homes and businesses) to off-set (mitigate) any increases in travel demand and pay for its fair share of the multimodal projects adopted as part of the Mobility Plan. Mobility Fees are intended to be an alternative to transportation concurrency and road impact fees. They are not taxes on existing homes and businesses and are only assessed if development activity results in an increase in person travel demand. Mobility Fees are one of the funding sources available and provide the Town with greater flexibility to fund a variety of multimodal projects included in the Mobility Plan.

WHO WOULD PAY IF THE TOWN OF LAKE PARK ADOPTED A MOBILITY FEE?

Any new development activity that requires a building permit and results in an increase in person travel demand above the existing use of property. Mobility Fees are not a tax and they are not charged to existing homes or businesses; unless there is an addition, change of use, expansion, or modification that generates additional person travel demand (impact) above the existing use of the property. If an existing property owner has a vacant lot and applies for a building permit to construct a new home, then they would be required to pay an adopted Mobility Fee. Florida statute exempts governmental uses, along with public and charter schools, from paying Mobility Fees.

HOW ARE THE FEES DETERMINED?

Mobility Fees are determined through an evaluation of the existing and projected population and employment that demonstrates the need for future multimodal projects to accommodate the person travel demand from future growth. Mobility Fees are then calculated based on the cost and person capacity of the multimodal projects adopted as part of the Town's Mobility Plan. A Mobility Fee is based on detailed methodologies designed to meet the dual rational nexus test and rough proportionately test established by case law and Florida Statute.

A detailed technical report has been developed to document how the Mobility Fee is calculated and demonstrate legal and statutory compliance. The results of the detailed technical report will be a simplified table, known as the Mobility Fee Schedule (seen in the detailed technical report). The Mobility Fee Schedule includes different land uses and the Mobility Fee rate assessed for each land use based on a specific unit of measure.

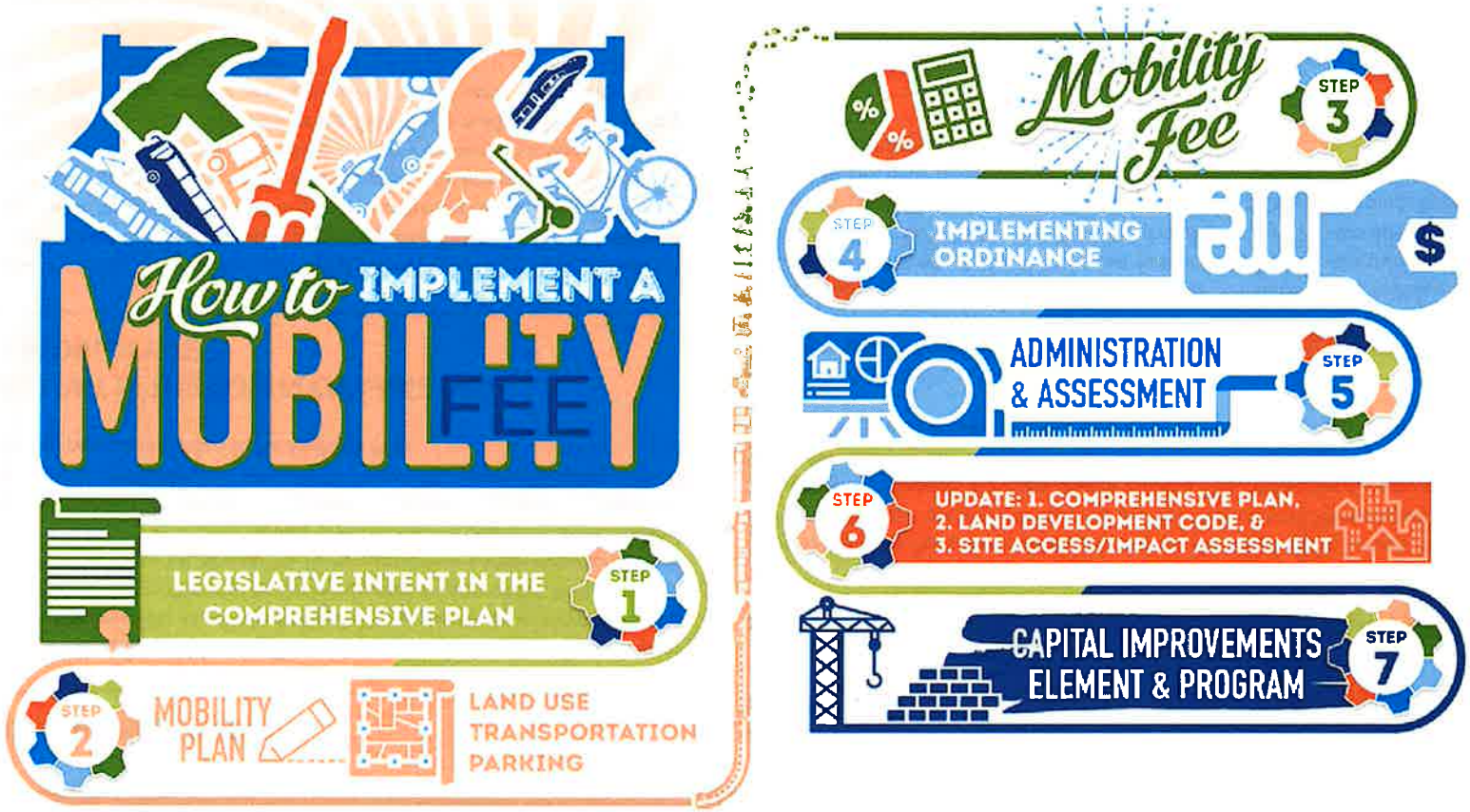
HOW WILL THE TOWN FUND MOBILITY PLAN PROJECTS?

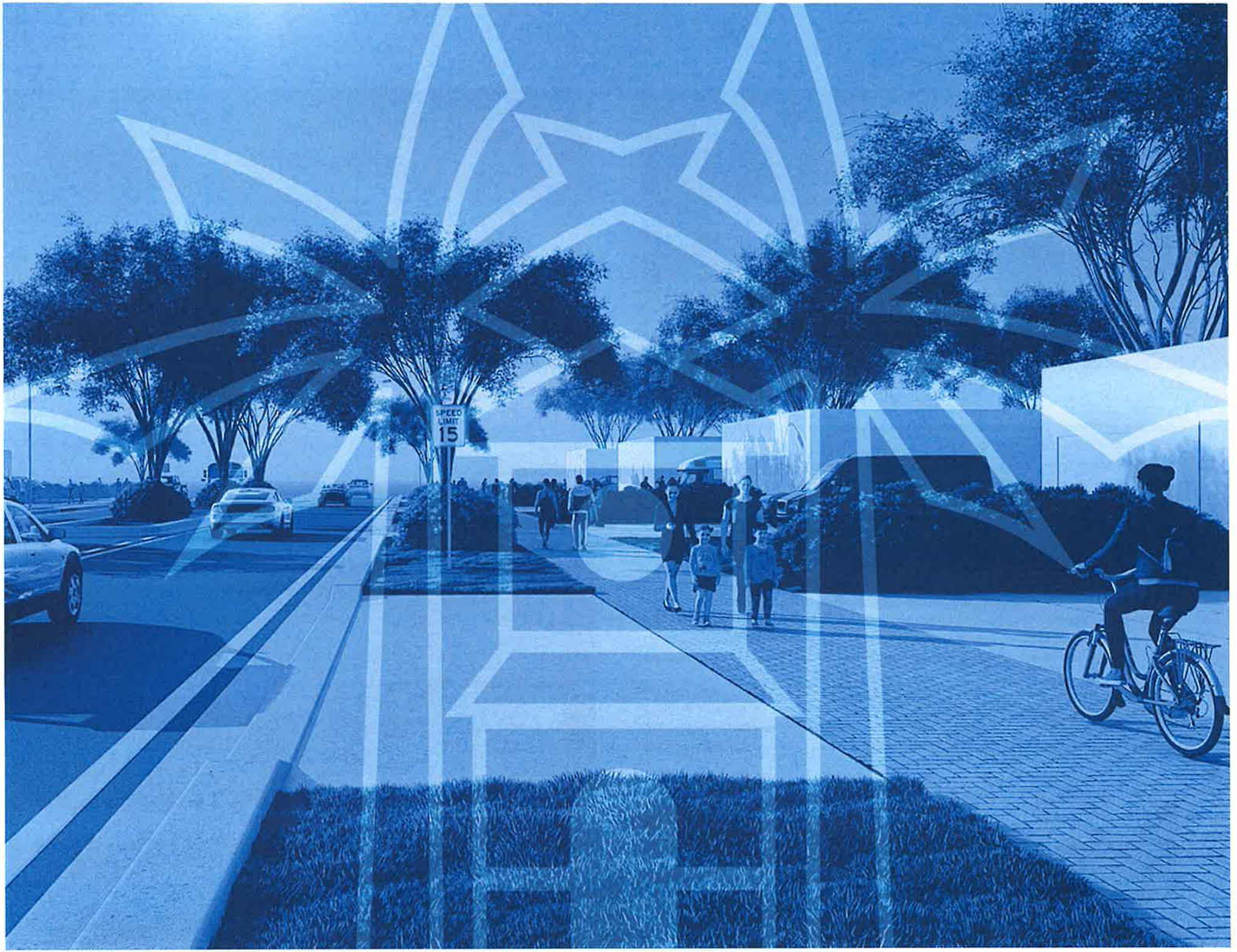
Beyond Mobility Fees, the multimodal projects identified in the Town's Mobility Plan can be funded through a variety of sources, such as Federal and State earmarks, funds, grants, and programs through the Palm Beach County TPA. While the County does collect gas taxes, the majority of those funds are used to maintain current infrastructure. If the County adopted an infrastructure sales tax, a portion of those funds could be used to fund Mobility Plan projects.

The Town could also consider the use of special assessments, Community Redevelopment Area (CRA) funds, property taxes, and tourist development taxes to help fund Mobility Plan projects. Services and programs such as shared micromobility and low speed electric vehicle programs may also charge user fees to pay for the program and services. The identification of multimodal projects as part of a mobility plan provides the Town with the means to proactively pursue appropriations and additional funding opportunities that frequently become available to promote economic development or economic stimulus programs and grants.

HOW ARE MOBILITY FEES IMPLEMENTED?

The following are the seven steps involved in the implementation of a Mobility Fee. This report illustrates the plans proposed to be adopted as part of step 2 and the projected Mobility Fee identified in step 3. The Town will also adopt an implementing mobility fee ordinance as part of the Mobility Plan and Fee adoption. The Town has already established legislative intent in the Comprehensive Plan. Once the Mobility Plan & Mobility Fee have been adopted and the necessary updates to the comprehensive plan, land development code, and site access / impact assessments are complete, the Town can begin programming multimodal projects from the Mobility Plan into its Capital Improvements Program.

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15

COMPLETE STREETS

WHAT ARE COMPLETE STREETS?

Complete Streets are streets that are designed and maintained in consideration of people of all ages and abilities, whether they are walking, biking, scooting, taking the bus, driving, or using wheelchairs. There is no one-size-fits-all design standard for Complete Streets; each Complete Street is unique and context sensitive.

In order to enable safe, convenient, and comfortable travel and access for all people, Complete Streets may include bicycle lanes / ways, multimodal lanes / ways, shared-use paths, trails, traffic calming, landscaped medians / buffers, narrower travel lanes, roundabouts, curb extensions, high visibility crosswalks, and more.

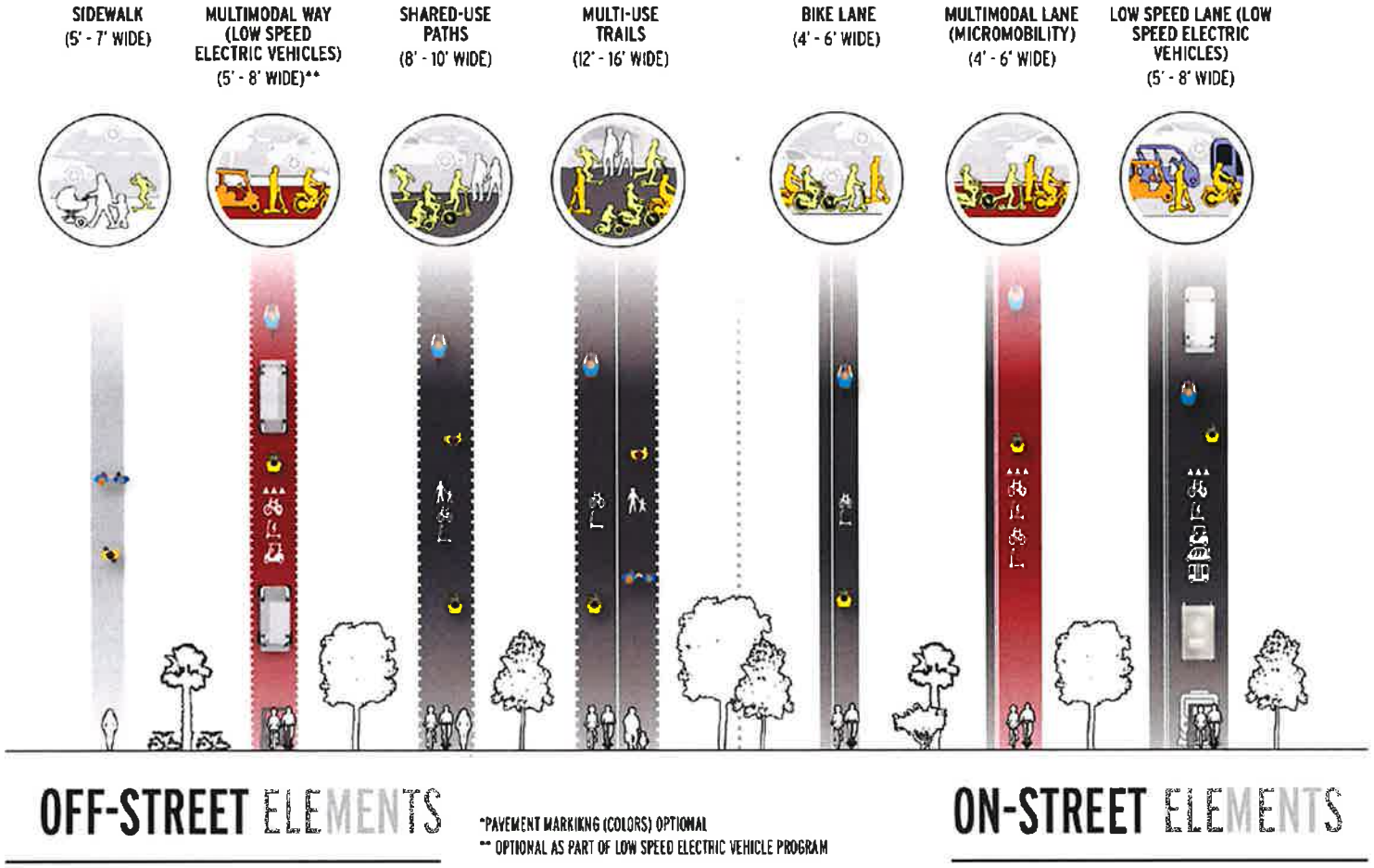
WHAT IS A COMPLETED NETWORK?

A Complete Network is a network of Complete Streets that is connected, without gaps, and forms a well-integrated system between the various modes of transportation. A Completed Network will provide the Town of Lake Park the opportunity to better utilize its public space to offer safe and convenient transportation for all road users regardless of age, background, ability, or mode of travel, while incorporating the Town's historic, cultural and environmental assets.

MULTIMODAL PROJECTS

WHAT ARE MULTIMODAL PROJECTS?

The Mobility Plan accommodates different types (modes) of travel on a variety of multimodal facilities (e.g., bike lanes, paths, roads, sidewalks, and trails). The image below illustrates the types of multimodal projects, both on-street and off-street, that are included in the Mobility Plan. Sidewalks and bike lanes are intended to be primarily used by people bicycling and walking (non-motorized travel). Shared-use paths, multimodal lanes, and multi-use trails can also be used by micromobility devices (motorized travel). Further, low speed lanes (on-street) and multimodal ways (off-street) are optional infrastructure typologies that could be implemented as part of a future Micromobility & Low Speed Electric Vehicle Program and would accommodate low speed electric vehicles such as golf carts and microtransit vehicles.



MULTIMODAL PROJECTS

HOW WERE MULTIMODAL PROJECTS IDENTIFIED?

The multimodal projects identified in the Mobility Plan were established based on the fundamental multimodal elements necessary to transition from a transportation system focused on moving cars towards a safe, comfortable, and convenient multimodal transportation system focused on moving people and providing mobility choices.

MOBILITY: The ability to move people from place (origin) to place (destination) by multiple modes (walk, bike, transit, vehicle) of travel in a timely (speed) and efficient manner. The lack of sidewalks, paths, trails, bike lanes, and curb access ramps are often impediments to people choosing to walk or bike from home to work and other daily activities.

EQUITY: The ability to access relevant activities such as employment, education, entertainment, health care, personal services, recreation, and retail opportunities by people of all ages, abilities, race, and socioeconomic strata without undue and unjust burden. Equitable mobility provides transportation justice for not only underserved and/or disadvantaged communities but also for vulnerable users. People have a fundamental right to move around easily, safely, and conveniently.

ACCESSIBILITY: The ease at which people reach, enter, and use modes of travel (walk / bike / transit / vehicle) at the origin and destination of their trip. Transit systems are frequently burdened with addressing the issue of first and last mile access. Providing Americans with Disabilities Act (ADA)-compliant curb access ramps at origins, destinations, intersections, driveways, and mid-block crossings is imperative to removing impediments for vulnerable users such as the disabled, children, the elderly, and people riding bicycles and micromobility devices.

CONNECTIVITY: The number of route options people have available to them and their directness and/or distance. Gridded street networks provide a high level of connectivity, whereas dead-end cul-de-sacs do not. Innovative approaches to enhance connectivity, such as Low Speed and Shared Streets, along with using paths and trails for non-vehicular connections, improve mobility and accessibility for people walking, bicycling, riding micromobility devices, and accessing transit.

VISIBILITY: The frequency at which those driving a car see people walking, bicycling, riding various micromobility devices, and accessing transit. More people walking and biking = greater awareness and more people walking and biking = safer conditions (i.e. safety in numbers). Green bike lanes, pavers at crosswalks, and flashing signals are all design elements used to increase visibility of people walking and bicycling.

CONTINUITY: The uninterrupted consistency of sidewalks, paths, trails, and bike lanes in width and condition with logical beginning and endpoints that are without gaps and without sudden and abrupt termination. Roads do not suddenly terminate without warning, change number of lanes, or randomly change width without proper transitions — neither should sidewalks, paths, trails, or bike lanes.

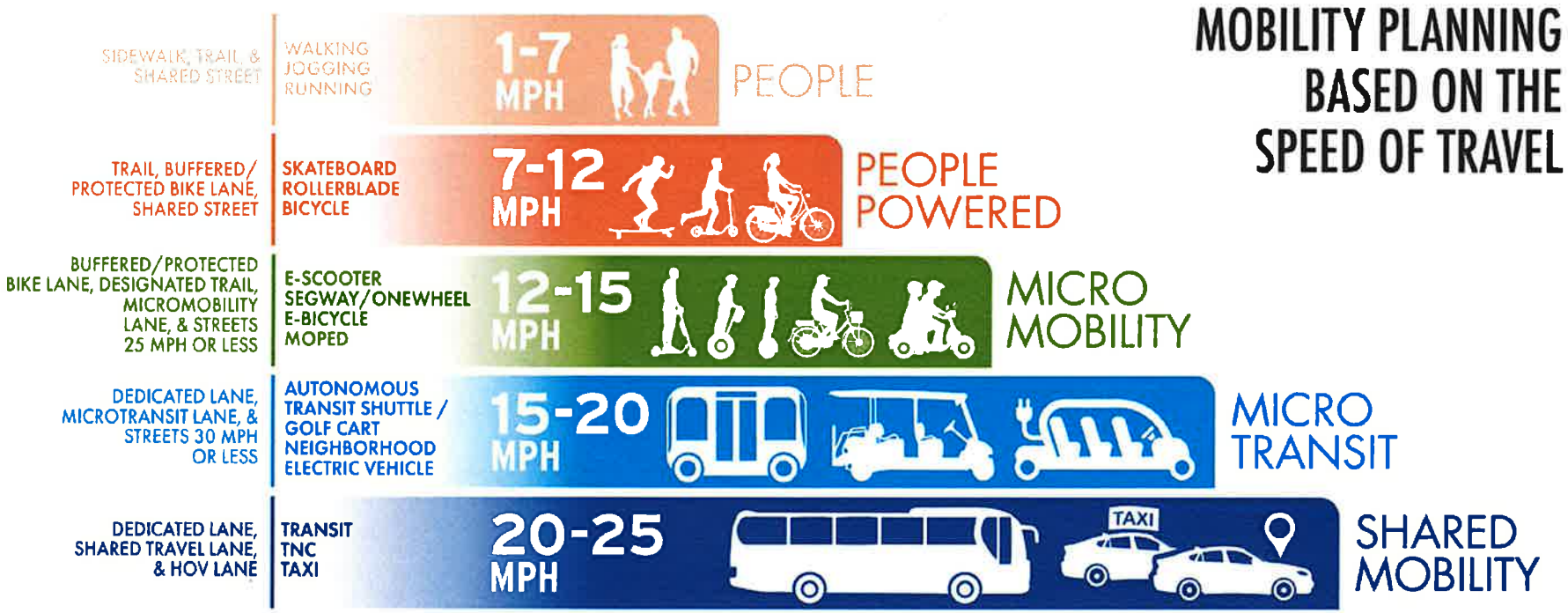
SAFETY: The combination of behavioral and physical design elements of the built environment can make mobility comfortable and pleasant for all ages and abilities. The elements that provide safety include slower speeds, physical separation, enhanced visibility crossings, and designations for different mobility modes. Enhanced safety features encourage behavioral changes that make safety everyone's responsibility.

COMFORT: The sum of all the mobility elements plus the overall quality of the built environment provided for the various mobility modes that allow for comfortable travel, trip satisfaction, travel choice, and time-cost choice. The perception of comfort shows that the availability of a car doesn't automatically make it a first mode choice and the most obvious or direct route may also not be the most comfortable. Improving conditions can remove impediments, increase trip satisfaction and usefulness, and incline travellers to use non-vehicular modes.

SOCIAL VALUE: The people-to-people connections one experiences in a shared space environment, whether biking, walking, or riding transit. The social value of these interactions increases both individual happiness and societal happiness through active engagement with the community that overall increases the quality of life and fosters independence, especially for children and the elderly.

TRAVEL SPEED

Sidewalks and paths are designed to accommodate people bicycling, jogging, walking, or pushing a stroller at 1 to 7 miles per hour. People riding an electric low speed vehicle, a transit circulator, or driving a golf cart are moving between 10 and 20 miles per hour and are not currently accommodated on most major roads in the Town. It is not preferred, and can be unsafe for pedestrians, for electric bicycles or electric scooters to use sidewalks in the Town, even though Florida Statute allows them to be used wherever bicycles are used. It is also not preferred, and most often not safe, for bicycles, golf carts, or scooters to use the entire lane on major roads, even though Florida Statute allows them to use the entire lane where other options are not available. Roads are designed to accommodate people driving cars between 20 and 50 miles per hour. The Mobility Plan attempts to accommodate multiple modes, traveling at varying speeds, with infrastructure that is appropriate and safe for each mode.



MOVING TOWARDS VISION ZERO

WHAT IS VISION ZERO?

Vision Zero is a fundamentally different way to approach traffic safety that includes:

1. A goal to eliminate traffic fatalities and serious injuries; and
2. A multifaceted strategy for how to reach this goal and provide safe, healthy, and equitable mobility for people of all ages and abilities.

Vision Zero originated in Sweden and in 2019 the City of Oslo was the first to achieve zero traffic deaths. While the feasibility of achieving Vision Zero has been controversial, the concept has quickly swept across the globe where many cities have adopted Vision Zero policies and action plans that have facilitated significant steps forward to create safe transportation systems for all people.

The Vision Zero strategy is governed by a Safe Systems approach. This approach acknowledges that people make mistakes, but these mistakes shouldn't lead to death. A Safe System is designed and managed to be forgiving to human error and to keep the risk of a mistake low. Implementation of the Vision Zero strategy is guided by three principals: ***Engineering, Education, and Enforcement.***

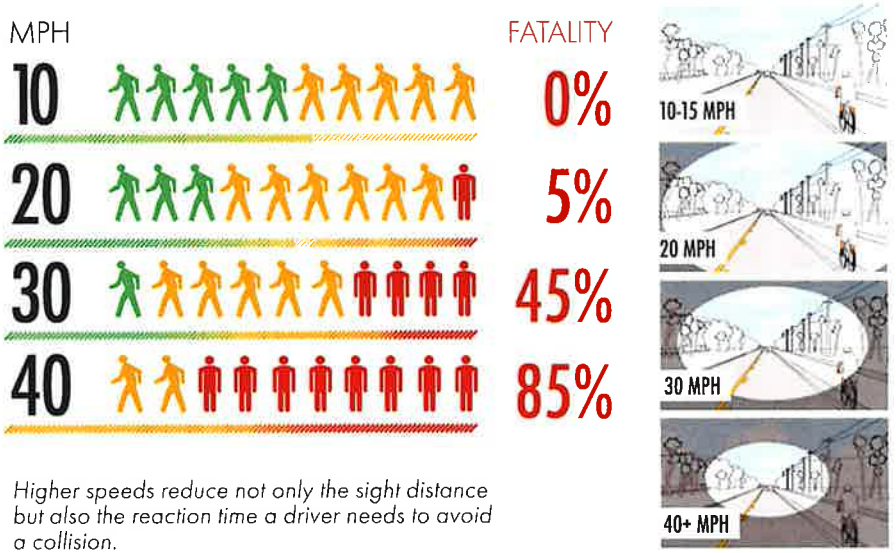
WHY IS VISION ZERO NEEDED?

In 2021, traffic fatalities in Florida rose nearly 10% to a total of 3,629 lives lost on our roadways. Every year, close to 40,000 people are killed on streets in the United States. In a country built for cars, traffic crashes and fatalities have been taken for granted as a fact of life for decades and "drive safe" has become a standard pleasantry – but things haven't always been this way, and they don't have to be in the future. Crashes are preventable.

DESIGN FOR SAFE SPEED

There are two primary components in moving towards Vision Zero and Safer Streets for All: multimodal projects and speed of cars. Speed is the most important variable in reducing crashes, traffic deaths and serious injuries. Studies have shown there is a direct correlation between the speed of car travel and the severity of crashes. As speed increases, so does the probability that a crash involving vulnerable road users (people walking, bicycling, scooting, in wheelchairs, etc.) or motorists will result in one or more fatalities. Traveling at a speed of 40 mph, a vehicle needs 145 feet to reach a full stop, while traveling at 20 mph only 45 feet is needed. Similarly, if a person is hit by a vehicle traveling 40 mph there is only a 10% chance of surviving the crash, while at 20 mph there is a 90% chance of survival.

As speed increases, so does the risk of dying in a crash



Higher speeds reduce not only the sight distance but also the reaction time a driver needs to avoid a collision.

The primary factor in determining vehicle speed is the design of the roadway. Regardless of the posted speed limit, most drivers will travel at a speed that feels comfortable. This comfortability is largely determined by design factors such as lane width, road alignment (straight or curved), turning radii, the presence of multimodal infrastructure, the degree to which modes are mixed or separated, and visual friction (the density and variability of roadside development).

Further, while it might be assumed that driver speeds are determined by speed limits, the opposite is true. Speed limits are determined using the 85th percentile rule, which says that speed limits should be set at "the speed at or below which 85 percent of all vehicles are observed to travel under free-flowing conditions." This makes it even more imperative to design roads with lower target design speeds. The lower the design speed, the greater the emphasis on the safe movement of people, whether they are walking, bicycling, or driving.

MOVING TOWARDS VISION ZERO

WHAT ARE LEVEL OF SERVICE STANDARDS?

Level of Service (LOS) standards are transportation service standards developed to help governments analyze operational traffic conditions and to allow for planning and prioritizing road capacity projects. What is lacking in this traditional approach is the ability to analyze conditions and provide services for people using multimodal mobility modes.

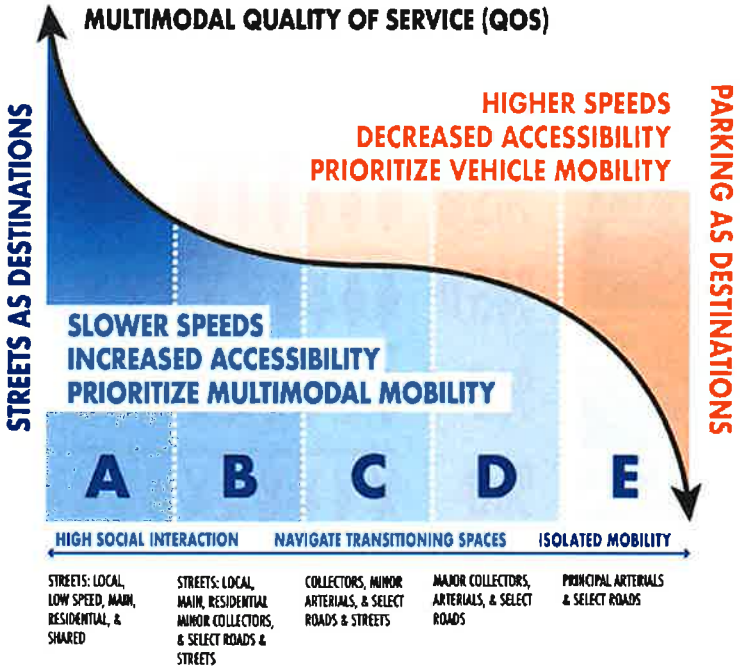
WHAT ARE QUALITY OF SERVICE STANDARDS?

The establishment of street Quality of Service (QOS) standards based on the posted speed limit is both an alternative and a complement to roadway LOS standards. While roadway LOS standards are based on road capacity to move cars, street QOS standards are intended to enhance mobility and safety for all users of the transportation system by prioritizing slower speeds for cars. Street QOS standards are the inverse of roadway LOS standards in that as speed limits go down, street QOS goes up.

The Town established policies in its Comprehensive Plan to move towards Vision Zero and Safer Streets for All through the use of Quality of Service standards. The Mobility Plan identifies multimodal projects to enhance safety, convenience, and connectivity for all users of the transportation system. The following Street Quality of Service (QQOS) standards, based on posted speed limits, are recommended to be adopted in the Comprehensive Plan in recognition that slower speeds create a safer transportation system for all modes of travel. Lowering speed limits is a quick and inexpensive way to move towards Safer Streets for All and, when used with street QOS standards, provide planners and engineers with greater flexibility to implement innovative street designs, such as low speed and complete streets, narrower travel lanes, and locating buildings and trees closer to travel lanes.

Establishing street QOS standards based on posted speed limits more accurately reflects the intended purpose of a street or road and the desired level of people walking and bicycling, along with access to adjacent land uses. The lower the speed, the greater the accessibility to adjacent land uses and an emphasis on safely walking and bicycling. The higher the speed limit, access to adjacent land uses becomes more restrictive, with a greater emphasis on the movement of vehicles.

The following graphic visualizes the Street Quality of Service (QOS) continuum and the type of mobility experience that each QOS standard provides. QOS standard A provides a street environment that prioritizes slower speeds, accessibility, and multimodal mobility for people. These streets not only help people reach their destinations, but can be destinations themselves that reclaim street space for spending time and offer a high level of social interaction. These are typically livelier streets that may include landscaping, public art, sitting and dining areas, and other elements that improve the sociability of the street. QOS A streets can be local, residential, low speed, main or shared streets that require road users to travel slowly and actively engage with both the urban environment and other road users. As QOS goes down, there are more opportunities for conflict and road users must navigate through transitioning spaces that make multimodal design compromises to accommodate increased vehicle flow. On the other end of the continuum, street design for QOS E prioritizes higher speeds and vehicle travel between destinations resulting in a more isolated mobility experience.



MOVING FROM LEVEL OF SERVICE TO QUALITY OF SERVICE

Just because a lower speed limit is posted, does not mean cars will slow down. Slowing down cars requires physical changes to the street right-of-way that result in people driving slower and people feeling more comfortable bicycling and walking. Changes in speed limits and resulting changes in street QOS standards should be phased in over time as part of: (1) designing new multimodal projects; (2) reimagining and repurposing existing right-of-way to emphasize the safe movement of people, versus the quick movement of cars; and (3) as part of neighborhood traffic calming projects to improve safety and reduced cut through traffic. The QOS standards and corresponding posted speed limit for the Town are shown in the figure below.

The Town does not currently have LOS standards for sidewalks, bike lanes, and transit. The proposed multimodal QOS standards will be used to establish multimodal capacities for use in the mobility fee calculations and can be used by the Town for performance measures, mobility planning, design standards, and prioritizing multimodal projects. Multimodal QOS standards for people walking and bicycling are based on: (1) the width of the facility (i.e., bike lane, path, sidewalk); (2) the type of physical separation between multimodal facilities and travel lanes for cars, SUVs, trucks, and other motor vehicles; and (3) the posted speed limit. The following multimodal QOS standards for people bicycling and walking on off-street sidewalks, paths, and trails vary based on the width of the facility, the type of physical separation from motor vehicle travel lanes (e.g., street trees, on-street parking) and posted speed limit.

MOVING TOWARDS VISION ZERO | TOWN OF LAKE PARK MULTIMODAL QUALITY OF SERVICE STANDARDS

STREET QUALITY OF SERVICE (QOS) STANDARDS	MOBILITY FEE ASSESSMENT AREA	APPLICABLE LOCATIONS
MICROMOBILITY SPEED LIMITS*	SPEED LIMIT 10 / SPEED LIMIT 15	BICYCLE LANES / MULTIMODAL LANES / MULTI-USE TRAILS / SHARED-USE PATHS
QUALITY OF SERVICE (QOS) A**	SPEED LIMIT 15	LOW SPEED STREETS / LOCAL STREETS / RESIDENTIAL TOWN STREETS
QUALITY OF SERVICE (QOS) B	SPEED LIMIT 20	LOCAL & RESIDENTIAL STREETS / MINOR COLLECTORS / SELECT ROADS & STREETS
QUALITY OF SERVICE (QOS) C	SPEED LIMIT 25	COLLECTORS / MINOR ARTERIALS / SELECT ROADS & STREETS
QUALITY OF SERVICE (QOS) D	SPEED LIMIT 30	MAJOR COLLECTORS / ARTERIALS / SELECT ROADS & STREETS
QUALITY OF SERVICE (QOS) E***	SPEED LIMIT 35 +	PRINCIPAL ARTERIALS

* MICROMOBILITY SPEEDS IN AREAS WITH HIGH LEVELS OF PEOPLE WALKING SHOULD BE MAX 10 MPH
** POSTED SPEED LIMIT IS MAXIMUM, LOWER SPEEDS ARE ALSO QOS A
*** POSTED SPEED LIMIT IS MINIMUM, HIGHER SPEEDS ARE ALSO QOS E

MOVING TOWARDS VISION ZERO | TOWN OF LAKE PARK MULTIMODAL QUALITY OF SERVICE STANDARDS

MULTIMODAL QUALITY OF SERVICE STANDARDS FOR BICYCLING & WALKING

	TYPES OF SEPARATION FROM TRAVEL LANES				
FACILITY TYPE	LIMITED SEPARATION	STREET TREES	ON-STREET PARKING	LANDSCAPE BUFFER	SPEED LIMIT 25 MPH OR LESS
SHARED-USE PATH OR MULTI-USE TRAIL (12' OR WIDER)	B	A	A	A	A
SIDEWALK OR SHARED-USE PATH (10'- 11' WIDE)	C	B	B	B	B
SIDEWALK OR SHARED-USE PATH (8'- 9' WIDE)	D	C	C	C	C
SIDEWALK (5'- 7' WIDE)	E	D	D	D	D

SOURCE: QOS STANDARDS ESTABLISHED BY NUE URBAN CONCEPTS, LLC
NOTES: THE PRESENCE OF TWO OR MORE PHYSICAL SEPARATION FEATURES, SUCH AS ON-STREET PARKING AND STREET TREES WOULD RESULT IN AN INCREASE IN ONE ADDITIONAL LETTER GRADE FOR EXAMPLE, A TEN (10) FOOT WIDE PATH WITH STREET TREES AND ON-STREET PARKING WOULD ACHIEVE A QUALITY OF SERVICE OF "A". A FIVE (5) FOOT WIDE SIDEWALK WITH STREET TREES AND A LANDSCAPE BUFFER WOULD ACHIEVE A QUALITY OF SERVICE OF "C".

MOVING FROM LEVEL OF SERVICE TO QUALITY OF SERVICE

MOVING TOWARDS VISION ZERO | TOWN OF LAKE PARK MULTIMODAL QUALITY OF SERVICE STANDARDS

MULTIMODAL QUALITY OF SERVICE STANDARDS FOR BICYCLING & MICROMOBILITY

	TYPES OF SEPARATION FROM TRAVEL LANES			SIGNS AND / OR MARKINGS	
FACILITY TYPE	LIMITED SEPARATION	PROTECTED	BUFFERED	ENHANCED VISIBILITY MARKINGS	MAX POSTED SPEED LIMIT
BIKE / MULTIMODAL LANE (6' OR WIDER)	C	A	B	B	SPEED LIMIT 25 B
BIKE / MULTIMODAL LANE (5' WIDE)	D	A	B	C	SPEED LIMIT 25 C
BIKE / MULTIMODAL LANE (4' WIDE)	E	B	C	D	SPEED LIMIT 25 D
PAVED SHOULDER (ARTERIALS ONLY)	E	B	C	D	SPEED LIMIT 25 D
LOW SPEED STREET *LOCAL/RESIDENTIAL STREET ONLY*	D	A	B	B	SPEED LIMIT 20 B

SOURCE: QOS STANDARDS ESTABLISHED BY NUE URBAN CONCEPTS, LLC

NOTES: THE PRESENCE OF BUFFERED BIKE LANES OR ENHANCED VISIBILITY MARKINGS AND A POSTED SPEED LIMIT AT THE MAXIMUM POSTED SPEED OR LESS WOULD RESULT IN AN INCREASE IN ONE (1) LETTER GRADE. PROTECTED BIKE LANES FEATURE A PHYSICAL BARRIER SUCH AS A RAISED MEDIAN BETWEEN VEHICLE AND BICYCLE LANES. BUFFERED BIKE LANES FEATURE A BUFFER AT LEAST TWO (2) FEET IN WIDTH WITH EITHER CHEVRONS, RPMS, OR FLEX POST BETWEEN VEHICLE AND BICYCLE LANES. ENHANCED VISIBILITY INCLUDES PAVEMENT MARKINGS SUCH AS, GREEN OR BLUE LANES, GREEN OR BLUE LANE MARKINGS APPROACHING AND CROSSING INTERSECTIONS AND DRIVEWAYS, OR DOUBLE LINES, SPACED A MINIMUM OF FOUR (4) INCHES APART AND FEATURING RPMS OR FLEX POST BETWEEN VEHICLE AND BICYCLE LANES.

The multimodal QOS standards for on-street bike lanes or multimodal lanes and low speed streets that accommodate travel demand for people riding a bicycle, scooter, skateboard, or micromobility device are based on the width of the facility, the level of physical separation from motor vehicle travel lanes, the visibility of the facility, and the posted speed limit. The term "bike lane" no longer reflects all the potential users of these lanes that accommodate people traveling between 5 and 15 mph.

The term "multimodal lane" provides a way to accommodate additional modes of travel besides bicycles. Neither FDOT, AASHTO, or NACTO have settled on a defined term for these multimodal lanes that accommodate travel beyond just bicycles. Advisory "bike lanes" are primarily intended for local and residential streets and can accommodate multiple modes of travel. The proposed multimodal QOS standards for people bicycling and riding micromobility devices are intended for on-street facilities. These modes, specifically bicycles, may also make use of street facilities such as sidewalks, shared-use paths, and multi-use trails.

COMPLETE STREETS PLAN

To enhance safe and convenient multimodal travel, improve connectivity, and provide diverse mobility choices, the Complete Streets Plan identifies a network of physical improvements to streets, intersections and other localized locations around the Town of Lake Park. The Mobility Plan is organized based on connected and integrated networks of complete streets, multimodal improvements, and low speed streets that work together to provide a completed, multimodal transportation system that fills gaps in the existing network, improves safety, comfort, and convenience of travel and expands healthy and sustainable mobility options for all road users. The Mobility Plan is centered around two main projects: (1) the West Park Avenue Curbless Main Street; and (2) the East Park Avenue Two-Lane Divided Complete Street. Both are key projects that will reimagine the historic downtown area as a place for people, breathing new life into the Town and transforming the character of the Town's transportation system. Park Avenue between US Highway 1 and 7th Street will be enhanced as a beautiful, landscaped boulevard and lead to a roundabout at Park Avenue and 7th Street which will mark the gateway to downtown where placemaking signage and features will elevate the character and walkability of this historic area.

A notable feature of Lake Park's existing transportation system is its high quality street grid system with larger-than-usual street rights-of-way. Leveraging this, a key strategy in the Complete Streets Plan is to repave and restripe these streets to slow traffic by narrowing vehicle lanes and provide more mobility choices by adding multimodal lanes (bicycles and low speed electric vehicles). This approach makes it possible for the Town of Lake Park to implement a quick-build, low cost multimodal network. Certain streets are also recommended for restriping to create what are known as low-speed 'yield streets,' which function as a traffic calming measure to slow traffic. Yield streets allow for on-street parking and require drivers to use 'pull-off' locations to pass oncoming traffic.

The Mobility Plan also proposes several mobility programs that will aid in facilitating safer streets and creating more space for people in Lake Park.

STREET PROJECTS

- Multimodal Improvement
- Complete Street
- Two (2) Lane Divided Complete Street
- Priority Residential Traffic Calming Street
- New Future Two (2) Lane Road
- Developer-driven New Future Two (2) Lane Road

INTERSECTION PROJECTS

- High Visibility Crosswalk
- High-Intensity Activated CrossWalKs (HAWK)
- Rectangular Rapid Flashing Beacon (RRFB)
- Roundabout
- Signalized Roundabout
- Intersection Improvements

SPECIAL PROJECTS — The Mobility Plan proposes the following special projects:

- Park Ave Curbless Main Street
- Park Ave Two-Lane Divided Complete Street
- Lake Park Greenway
- Waterfront Promenade
- North / South Lake Boat Underpass
- Congress to Lake Park Greenway

The Mobility Plan proposes the following special programs as next steps that will supplement the Mobility Plan projects and are necessary to reach a vision of safe and convenient travel for people in Lake Park:

- Residential Traffic Calming Program
- Streetscape, Street Trees, & Enhanced Landscape Program
- Green Alleys Program
- Micromobility & Low Speed Electric Vehicles Program
- Transit Stops Program
- Wayfinding Program
- Complete Streets Policy
- Corridor Planning

LAKE PARK 2045 MOBILITY PLAN

MOBILITY PLAN TABLE OF PROJECTS / STREETS PLAN

MAP / PROJECT ID	FACILITY NAME	FROM	TO	LENGTH (MILES)	PROJECT TYPE
1 [4]	US Hwy 1	Northlake Blvd (SR 850)	Silver Beach Road	1.03	Complete Street
2 [4]	Northlake Blvd	Lake Park Greenway	10th Street	0.58	Complete Street
3 [4]	Northlake Blvd (SR 850)	10th Street	US Hwy 1	1.25	Complete Street
4	10th Street	Northlake Blvd (SR 850)	Park Ave	0.67	Complete Street
5	10th Street	Park Ave	Silver Beach Road	0.42	Two (2) Lane Divided Complete Street
6	Park Ave West	Lake Park Greenway	Congress Ave	0.28	Complete Street
7 [4]	Congress Ave	Silver Beach Road	Northlake Blvd	1.01	Multimodal Improvement
8	Park Ave Extension	Terminus of Park Ave West	Old Dixie Hwy	0.67	Two (2) Lane Divided Complete Street
9	Old Dixie Hwy	Park Ave Extension	Park Ave	0.04	Complete Street
10	Park Ave	Old Dixie Hwy	10th Street	0.07	Complete Street
11	Park Ave	10th Street	7th Street	0.38	Park Ave Curbless Main Street
9	Waverly Rd Extension (CR 540)	SR 17 (Ridge Scenic Highway)	Lake Mabel Loop Rd/Powerline Ext	0.99	New Complete Street
10	New Rd	NE Polk US Hwy 27 Reliever	CR 540A	2.40	New Complete Street
12	Park Ave	7th Street	US Hwy 1	0.73	Two (2) Lane Divided Complete Street
13 [2,4]	Lake Park Greenway	Northlake Blvd (SR 850)	Silver Beach Rd	1.06	Greenway
14	Watertower Road	Congress Ave	Old Dixie Hwy	0.5	Multimodal Improvement
15 [1]	Watertower Road Extension	Old Dixie Hwy	Park Ave	0.25	New Two (2) Lane Road (Developer)
17 [1]	Congress to Lake Park Greenway	Congress Ave	Lake Park Greenway	0.21	Greenway
19	12th Street Connector	Watertower Road	Park Ave Extension	0.16	New Two (2) Lane Road
21	Park Ave to Silver Beach Connector	Industrial Ave Connector	Silver Beach Road	0.26	New Two (2) Lane Road (Developer)
23	Industrial Ave Connector	Park Ave to Silver Beach Connector	Old Dixie Hwy	0.15	New Two (2) Lane Road
24 [1]	S. Killian Drive Extension	Watertower Road Extension	Killian Drive	0.36	New Two (2) Lane Road (Developer)
25	S. Killian Drive	S. Killian Drive Extension (24)	S. Killian Drive Extension (26)	0.29	Two (2) Lane Divided Complete Street
26 [1]	S. Killian Dr Extension	S. Killian Drive	Congress Ave	0.12	New Two (2) Lane Road (Developer)
27 [2,4]	Silver Beach Road Extension	Garden Drive	West of Congress Ave	0.38	New Two (2) Lane Road
28	Silver Beach Road	Old Dixie Hwy	US Hwy 1	1.06	Two (2) Lane Divided Complete Street
29	Silver Beach Road	US Hwy 1	Lake Shore Drive	0.07	Complete Street
30	Flagler Blvd	Northlake Blvd (SR 850)	W. Jasmine Drive	0.32	Two (2) Lane Divided Complete Street
31	Flagler Blvd	W. Jasmine Drive	Palmetto Drive	0.69	Multimodal Improvement

1 Project requires right-of way from privately-owned property
2 Project requires utility easement
3 Project requires right-of-way owned by Palm Beach County
4 Entirely or partially located ***outside Lake Park Town limits***

MOBILITY PLAN TABLE OF PROJECTS / STREETS PLAN

MAP / PROJECT ID	FACILITY NAME	FROM	TO	LENGTH (MILES)	PROJECT TYPE
32	W. Jasmine Drive	Northlake Blvd (SR 850)	10th Street	0.74	Multimodal Improvement
33	Palmetto Drive	US Hwy 1	Flagler Blvd	0.21	Multimodal Improvement
34	Palmetto Drive	Flagler Blvd	W. Jasmine Drive	0.47	Low Speed Street
35	Crescent Drive	Northlake Blvd (SR 850)	Palmetto Drive	0.51	Low Speed Street
36	Seminole Blvd	Crescent Drive	Greenbriar Drive	0.23	Multimodal Improvement
37	6th Street	Flagler Blvd	Park Ave	0.16	Two (2) Lane Divided Complete Street
38	6th Street	Park Ave	Evergreen Drive	0.13	Two (2) Lane Divided Complete Street
39	6th Street	Evergreen Drive	Bayberry Drive	0.2	Multimodal Improvement
40	6th Street	Bayberry Drive	Silver Beach Road	0.06	Multimodal Improvement
41	7th Street	Crescent Drive	Silver Beach Road	0.77	Low Speed Street
42	5th Street	Flagler Blvd	Park Ave	0.15	Two (2) Lane Divided Complete Street
43	5th Street	Park Ave	Silver Beach Road	0.4	Low Speed Street
44	3rd Street	Palmetto Drive	Park Ave	0.38	Multimodal Improvement
45	3rd Street	Park Ave	Silver Beach Road	0.39	Multimodal Improvement
46	2nd Street	Evergreen Drive	Silver Beach Road	0.39	Low Speed Street
47	4th Street	Date Palm Drive	Silver Beach Road	0.2	Low Speed Street
48	9th Street	Northern Drive	Cypress Drive	0.77	Multimodal Improvement
49	Northern Drive	Flagler Blvd	10th Street	0.38	Low Speed Street
50	West Road	Poplar Drive	Northern Drive	0.14	Low Speed Street
51	Prosperity Farms Road	Northlake Blvd (SR 850)	10th Street	0.23	Complete Street
52	Poplar Drive	Prosperity Farms Road	Northern Drive	0.29	Low Speed Street
53	Poplar Ct	Poplar Drive	Northlake Blvd (SR 850)	0.05	Low Speed Street
54	Teak Drive	W. Jasmine Drive	Crescent Drive	0.21	Low Speed Street
55	Alley North of Teak Drive	W. Jasmine Drive	Existing terminus of the alley	0.27	Low Speed Street
55A [1]	Alley North of Teak Drive	Existing terminus of the alley	Twin Cities Mixed Use District	0.04	Multimodal Improvement
56	Greenbriar Drive	6th Street	5th Street	0.14	Low Speed Street
57	Date Palm Drive	US Hwy 1	6th Street	0.64	Multimodal Improvement
58	Date Palm Drive	6th Street	9th Street	0.36	Multimodal Improvement
59	Evergreen Drive	9th Street	US Hwy 1	1.1	Low Speed Street
60	Cypress Drive	6th Street	US Hwy 1	0.64	Low Speed Street

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4 Entirely or partially located ***outside Lake Park Town limits***

MOBILITY PLAN TABLE OF PROJECTS / STREETS PLAN

MAP / PROJECT ID	FACILITY NAME	FROM	TO	LENGTH (MILES)	PROJECT TYPE
61	Bayberry Drive	10th Street	US Hwy 1	1.02	Low Speed Street
62 [1]	Waterfront Promenade	Lakeshore Drive	Silver Beach Road	1.05	Waterfront Promenade
63	Tri-Rail Coastal Station	Park Ave	10th Street	-	Tri-Rail Coastal Station
64 [3]	Brant Road Extension	Park Ave Extension	Current Terminus of Brant Road	0.22	New Two (2) Lane Road (Developer)
65	Newman Road Connector	Newman Road	Park Ave to Silver Beach Connector	0.08	New Two (2) Lane Road (Developer)
67	Residential Traffic Calming Program	Town of Lake Park	Palm Beach County	2	Residential Traffic Calming Program
68	Streetscape, Street Trees & Landscape Enhancement Program	Town of Lake Park	Palm Beach County	17.37	Streetscape, Street Trees & Landscape Enhancement Program
69	Green Alleys Program	Town of Lake Park	Palm Beach County	1.5	Green Alley Program
70	Federal Highway Mixed Use District Overlay (FHMUDO)	Town of Lake Park	Palm Beach County	2.67	Federal Highway Mixed Use District Overlay (FHMUDO)
71	Micromobility & Low Speed Electric Vehicle Program	Town of Lake Park	Palm Beach County	-	Micromobility & Low Speed Electric Vehicle Program
72	Transit Stops Program	Town of Lake Park	Palm Beach County	-	Transit Stops

MOBILITY PLAN TABLE OF PROJECTS / INTERSECTIONS PLAN

MAP / PROJECT ID	LOCATION	PROJECT TYPE	CONSTRUCTION ENTITY	PROJECT DESCRIPTION
73 [4]	Northlake Blvd @ Congress Ave	High Visibility Crosswalk	Town	Add High Visibility Crosswalk
74	Northlake Blvd @ Old Dixie Hwy	High Visibility Crosswalk	Town	Add High Visibility Crosswalk
75	Northlake Blvd @ 10th Street	High Visibility Crosswalk	Town	Add High Visibility Crosswalk
76 [4]	Northlake Blvd @ US Hwy 1	High Visibility Crosswalk	FDOT	Add High Visibility Crosswalk
77	US Hwy 1 @ Date Palm	RRFB	FDOT	Add Rectangular Rapid Flashing Beacon
78	US Hwy 1 @ at Ilex	RRFB	FDOT	Add Rectangular Rapid Flashing Beacon
79	10th Street @ Prosperity Farms Road	Roundabout	FDOT	Construct one (1) lane ovalabout
80	Northlake Blvd @ Prosperity Farms Road	High Visibility Crosswalk	FDOT	Add High Visibility Crosswalk
81	Northlake Blvd @ Jasmine Dr	High Visibility Crosswalk	FDOT	Add High Visibility Crosswalk
82	Park Ave @ 5th Street	RRFB	Town	Add Rectangular Rapid Flashing Beacon
83	Silver Beach Road @ 7th Street	RRFB	Town	Add Rectangular Rapid Flashing Beacon
84	Silver Beach Road @ 5th Street	RRFB	Town	Add Rectangular Rapid Flashing Beacon

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2 Project requires utility easement
3 Project requires right-of-way owned by Palm Beach County
4 Entirely or partially located ***outside Lake Park Town limits***

MOBILITY PLAN TABLE OF PROJECTS / INTERSECTIONS PLAN

MAP / PROJECT ID	LOCATION	PROJECT TYPE	CONSTRUCTION ENTITY	PROJECT DESCRIPTION
86	Silver Beach Road @ Avenue S	Intersection Improvements	Town	Add traffic signal
87	Northlake Blvd @ Flagler Blvd	HAWK	Town	Add High-Intensity Activated CrossWalK (HAWK)
88	Northlake Blvd @ Crescent Drive	HAWK	Town	Add High-Intensity Activated CrossWalK (HAWK)
89	Park Ave @ 10th Street	Signalized Roundabout	Town	Add Signalized Roundabout
90	Park Ave @ Old Dixie Hwy	Intersection Improvements	Town	Add Intersection Improvements
91	Park Ave @ 7th Street	Roundabout	Town	Add Roundabout
92	Park Ave @ 3rd Street	RRFB	Town	Add Rectangular Rapid Flashing Beacon
93	Old Dixie Hwy @ Watertower Road	Roundabout	Town	Add Roundabout
94	Park Ave West Extension @ Industrial Ave Connector	Roundabout	Town	Add Roundabout
95	Old Dixie Hwy @ Park Ave West Extension	Signalized Roundabout	Town	Add Roundabout
96	Watertower Rd @ 12th Street	Intersection Improvements	Town	Add Intersection Improvements
98	Old Dixie Hwy @ S. Killian Street	Intersection Improvements	Town	Add Intersection Improvements
100	Watertower Road @ 13th Street	Intersection Improvements	Town	Add Intersection Improvements
101	Park Ave Extension @ Watertower to Park Ave Connector	Roundabout	Town	Add Roundabout
102	Old Dixie Hwy @ Independence Drive	Intersection Improvements	Town	Add Intersection Improvements
104	2nd Street @Evergreen Dr	Intersection Improvements	Town	Add intersection improvements and consider a traffic circle
105	Park Ave @ San Marco Circle	RRFB	Town	Add Rectangular Rapid Flashing Beacon
106 [4]	Silver Beach Road @ Garden Road	Intersection Improvements	Town	Add Intersection Improvements
107	Park Ave @ Lake Park Greenway	RRFB	Town	Add Rectangular Rapid Flashing Beacon
108	Congress Ave @ Congress to Lake Park Greenway	RRFB	Town	Add Rectangular Rapid Flashing Beacon
110	Date Palm Drive approximately 325' east of 3rd St	Intersection Improvements	Town	Add intersection improvements and consider a traffic circle
111	Northlake Blvd @ C-17 canal	Bridge Improvement	State	Elevate the bridge over the canal to increase access between North Lake and C-17 canal.
112	Congress Ave @ Park Ave West	Intersection Improvements	County	Add intersection improvements to address high crash location
113	Congress Ave @ S. Killian Dr Extension	Intersection Improvements	County	Add intersection improvements to address high crash location

MOBILITY PLAN TABLE OF PROJECTS / MULTIMODAL PLANS, PROGRAMS, SERVICES, & STUDIES

114	Town of Lake Park	Multimodal Plans, Programs, Services, & Studies	County	Mobility Program, Service, or Study

1 Project requires right-of way from privately-owned property
2 Project requires utility easement
3 Project requires right-of-way owned by Palm Beach County
4 Entirely or partially located ***outside Lake Park Town limits***

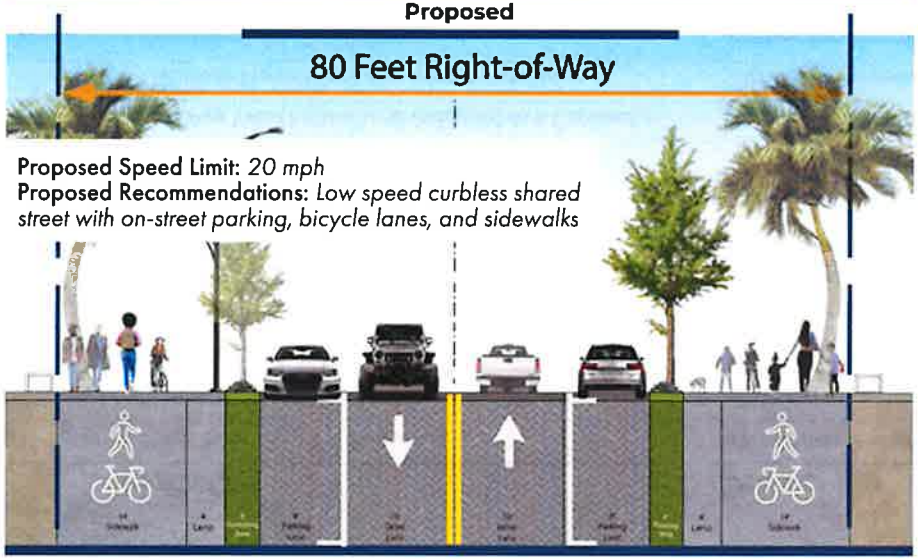
COMPLETE STREETS PLAN CROSS SECTIONS

PARK AVE CURBLESS MAIN STREET

Existing

Location: *from 7th to 10th*
Roadway Classification: *Collector*
Existing Speed Limit: *25 mph*
Length: *0.377 miles*

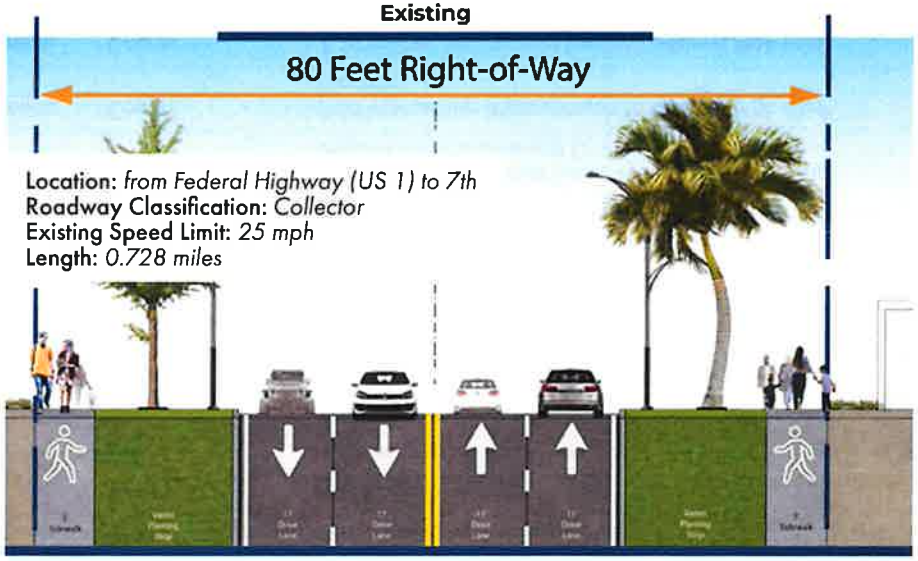
Proposed



Proposed Speed Limit: *20 mph*
Proposed Recommendations: *Low speed curbless shared street with on-street parking, bicycle lanes, and sidewalks*

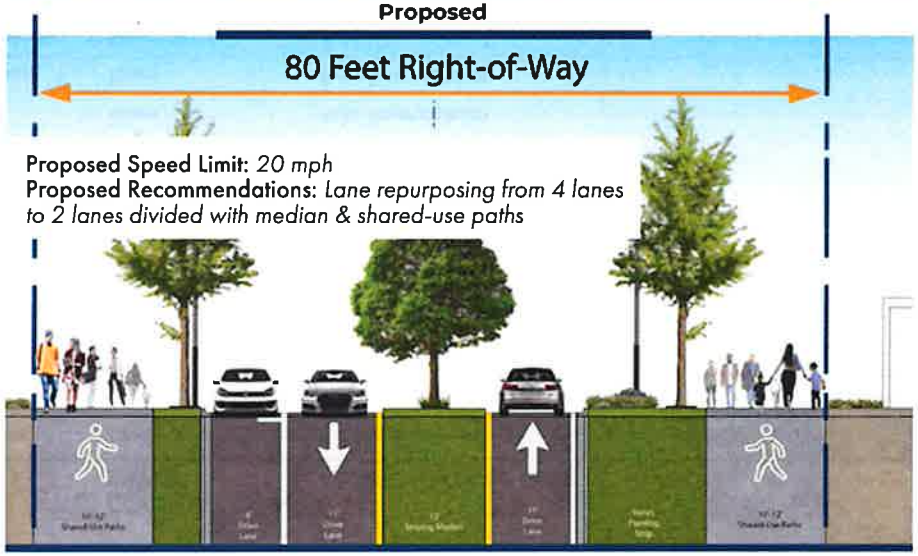
PARK AVE EAST TWO-LANE DIVIDED COMPLETE STREET

Existing



Location: *from Federal Highway (US 1) to 7th*
Roadway Classification: *Collector*
Existing Speed Limit: *25 mph*
Length: *0.728 miles*

Proposed



Proposed Speed Limit: *20 mph*
Proposed Recommendations: *Lane repurposing from 4 lanes to 2 lanes divided with median & shared-use paths*

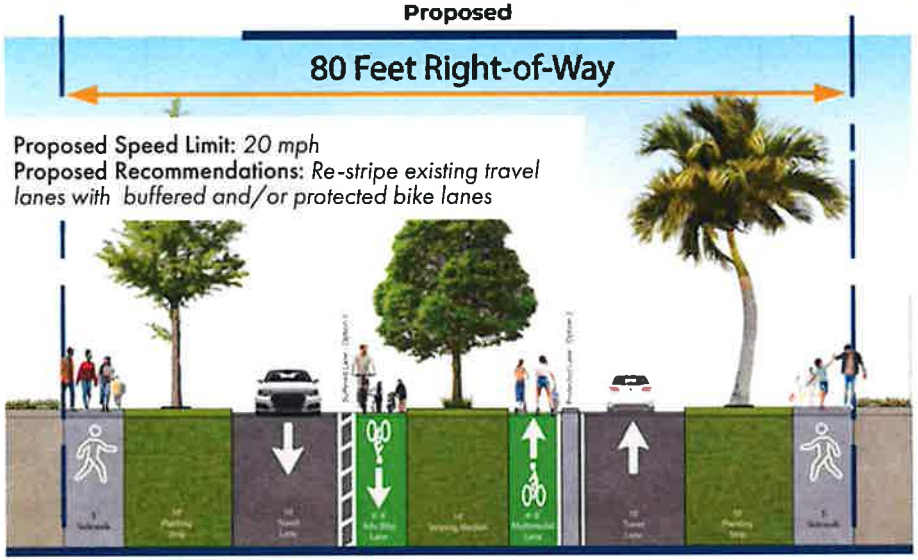
COMPLETE STREETS PLAN CROSS SECTIONS

FLAGLER BLVD BIKE / MULTIMODAL LANE

Existing

Location: *from Palmetto Dr to Jasmine Dr*
Roadway Classification: *Collector*
Existing Speed Limit: *25 mph*
Length: *1.000 mile*

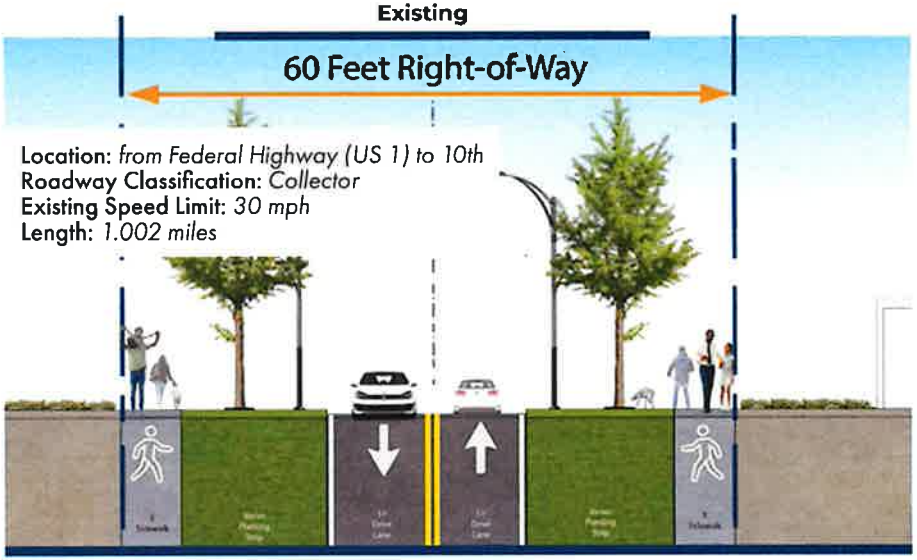
Proposed



Proposed Speed Limit: *20 mph*
Proposed Recommendations: *Re-stripe existing travel lanes with buffered and/or protected bike lanes*

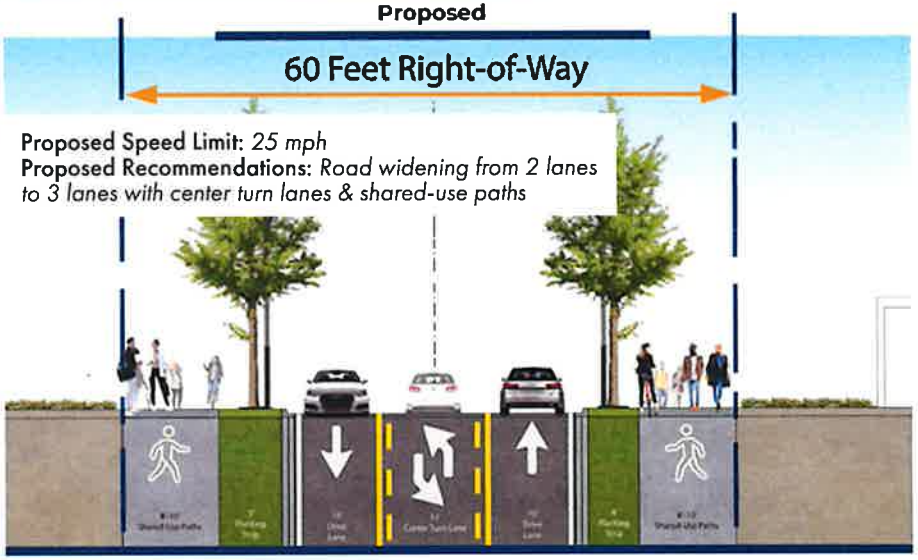
SILVER BEACH RD TWO-LANE DIVIDED COMPLETE STREET

Existing



Location: *from Federal Highway (US 1) to 10th*
Roadway Classification: *Collector*
Existing Speed Limit: *30 mph*
Length: *1.002 miles*

Proposed



Proposed Speed Limit: *25 mph*
Proposed Recommendations: *Road widening from 2 lanes to 3 lanes with center turn lanes & shared-use paths*

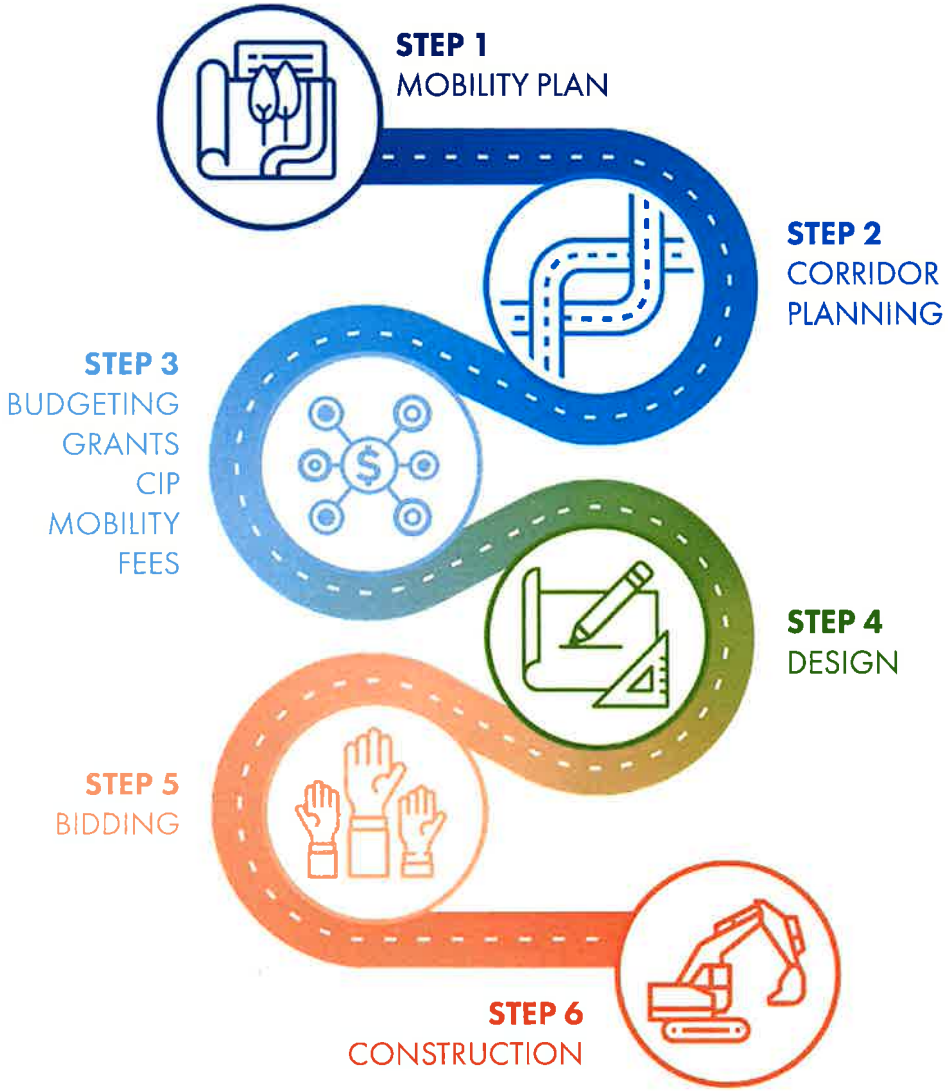
COMPLETE STREETS PLAN CROSS SECTIONS

NEIGHBORHOOD LOW SPEED STREET

Location: *Varies*
Roadway Classification: *Local*
Existing Speed Limit: *25 mph*
Length: *Varies*

Proposed Speed Limit: *20 mph*
Proposed Recommendations: *Neighborhood low speed street with on-street shared lanes or advisory bike lanes & traffic calmed.*

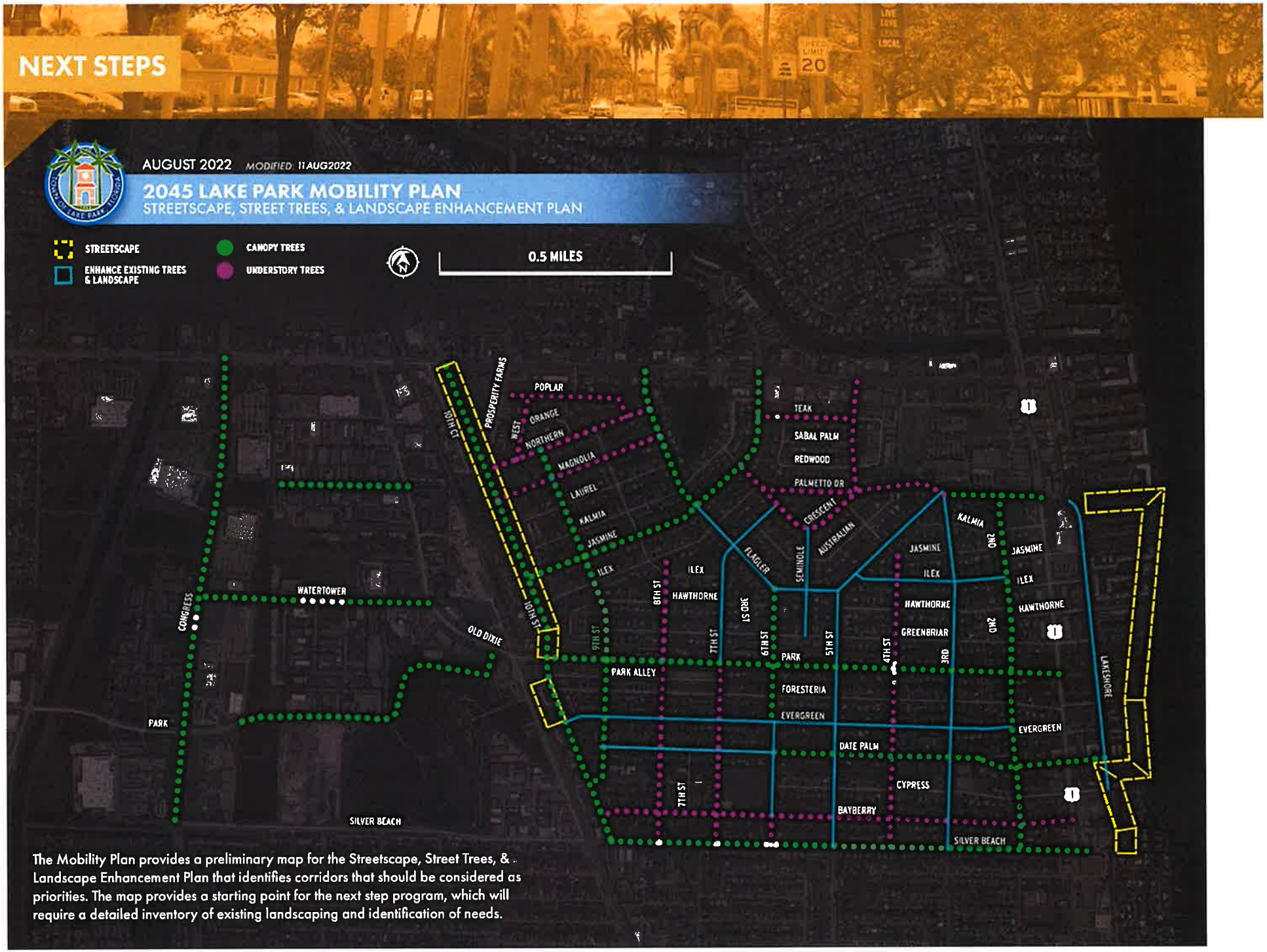
HOW WILL PROJECTS BE PRIORITIZED?



It is recommended that the Town of Lake Park consider prioritizing "low-hanging fruit" such as intersection improvements and traffic calming to begin developing a complete multimodal network. The detailed Mobility Plan provides a suggested time frame for each project's implementation, however some proposed projects may require a corridor study to further understand the depth and challenges of proposed design. Like with all major Capital Improvements Program (CIP) projects, corridor planning will allow the Town to explore the project's feasibility. Steps required to take projects from the Mobility Plan to final completion include planning/study, funding, design, bidding and construction. The most important step is to obtain funding for each project through mobility fees or the additional funding sources mentioned previously in the report.


SPEED LIMIT
15

NEXT STEPS



The Mobility Plan provides a preliminary map for the Streetscape, Street Trees, & Landscape Enhancement Plan that identifies corridors that should be considered as priorities. The map provides a starting point for the next step program, which will require a detailed inventory of existing landscaping and identification of needs.

NEXT STEPS

Lake Park has many opportunities to meet the needs of residents now and for years to come. The Mobility Plan and Mobility Fee is a step towards a more robust and reflective network. The following next step programs and policies will support the Town as it moves towards implementing the identified mobility projects. Adopting and developing these policies and programs will support long-term objectives and continue the short and near term momentum necessary to achieve plan elements.

1 INITIATE A TOWN BEAUTIFICATION PROGRAM (STREETSCAPE, STREET TREES, & LANDSCAPE ENHANCEMENT PLAN)

It is recommended that the Town of Lake Park pursue development of a Streetscape, Street Tree & Landscape Enhancement Program.

Streetscape and street trees are an important part of creating a safe, comfortable, and attractive environment for multimodal travel and improving the overall quality of service for people. The Mobility Plan recommends creating a Streetscape, Street Tree & Landscape Program, as a next-step by the Town. A program would conduct an inventory of existing landscape, identify appropriate types of canopy and understory trees, establish appropriate types of landscape treatments, and develop prioritization criteria. This program was identified to make streetscape, street tree, and landscape enhancements eligible project types for the expenditure of mobility fees.

The Program would focus on core Plan objectives including; enhancing existing trees and landscape, reflecting proposed streetscape projects, and adding canopy trees and landscape where complete streets, multimodal improvements, and traffic calmed streets are recommended.

Like any program design, the Town should dedicate staff to initiate and maintain the program. The Town's Beautification Program can be simply designed with an ordinance and the identification of a funding source. Like many other AiPP (Arts in Public Places) programs, 1% of developer fees can be dedicated to the Town's Beautification program. Implementation can be incorporated into the existing street maintenance program. Some communities utilized clubs and organizations to support maintenance needs and develop a public private partnership, creating a sense of pride and ownership.

An ordinance, when developed, would identify purpose(s), need(s), and detailed steps on how residents can petition for trees to be installed. The Town should consult with an arborist to provide a list of Florida native trees, such as a Gumbo Limbo, that does not require excessive watering. Below is a sample of what a Beautification program could entail:

PURPOSE: The Town of Lake park should initiate the Beautification Program to increase the Town's tree canopy, improve stormwater management and stabilize the earth's environment, and enhance its residential and public streets.

ELIGIBILITY: Single-family residences, neighborhoods and communities may qualify for the Beautification Program.

THE TOWN 'S RESPONSIBILITIES INCLUDE: Taking inventory of existing landscaping, identifying needs, purchasing the trees, locating all utilities, planting and incorporating the trees as part of the Town's inventory and maintenance program.

THE PROPERTY OWNER'S RESPONSIBILITIES INCLUDE: Watering-in to help establish the trees, and providing day-to-day care of the trees, which includes regular watering, fertilizing & keeping the tree(s) free from injury by equipment (weed whackers, lawn mowers, cars, etc.). The property owner is also asked to notify the Public Works Department of any problems or unusual changes to the trees.

COSTS: the Town, through the Tree Beautification Fund, will cover all of the expenses. There is no cost to the residents. The number of trees planted each year will be determined by the budget.

THE PROCESS: The Town should establish criteria for adding landscape, understory and canopy trees to existing street right-of-way. The Town should determine the appropriate trees and landscaping given right-of-way widths, irrigation availability, and stormwater management. The program should also establish prioritization criteria, study parameters, and resident requests for street tree and landscape enhancement. Town staff should schedule requested plantings on a case by case basis, which allows for site visits to take place, materials to be procured, and installation schedules to be coordinated. Every homeowner(s) who requests a street tree(s) is placed on a Street Tree Request List. Requests are entered, dated and categorized by address/zone. The Town staff will conduct a site visit to the property to determine if the site meets requirements, appropriate tree species, quantity and placement of a tree(s) in accordance to swale size and location. Once the quantity, species and location have been confirmed with the property/home owner(s), the trees are purchased and the planting is coordinated and scheduled.

NEXT STEPS

2 ADOPT A COMPLETE STREETS POLICY

It is recommended that the Town of Lake Park adopt a Complete Streets policy to guide project planning, design, and implementation.

WHAT IS A COMPLETE STREETS POLICY?

A Complete Streets policy is a resolution, ordinance, or executive order, that formally establishes a community's intent to plan, design, operate, and maintain a multimodal transportation system that is safe, comfortable, and convenient for all road users. The policy guides decision-making and provides legal standing to consistently fund and construct streets for people of all ages, backgrounds, abilities, and mode choice. This includes both the planning, design, and construction of new complete streets and multimodal infrastructure, as well as implementing complete streets elements into routine reconstruction and repaving projects.

There are currently 82 municipalities in Florida that have adopted Complete Streets policies.

WHY IS A COMPLETE STREETS POLICY NEEDED?

Adopting a Complete Streets policy helps local governments implement a comprehensive approach to road safety. A Complete Streets Policy intentionally sets a formal commitment from the Town of Lake Park to developing a complete, multimodal transportation system that provides mobility and accessibility to all the Town's residents, employees, and visitors no matter what transportation mode they are using. The Policy would guide planning and project implementation and ensure that a Complete Streets and Safe Systems approach is used in funding and design of all streets in the Town.

Having a Complete Streets policy can also make Lake Park more competitive when applying for federal and state grant funding such as Transportation Alternatives Program (TAP) funds, Safe Routes to School, US DOT Safe Streets and Roads for All, and more.

3 IMPLEMENT A WAYFINDING PROGRAM

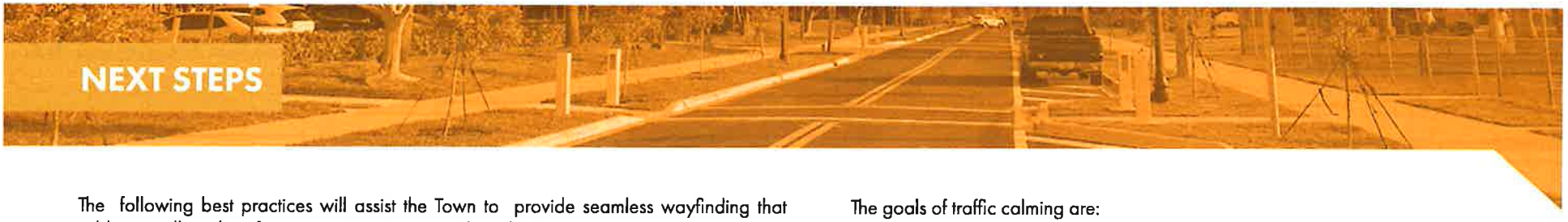
It is recommended that the Town of Lake Park implement a way finding program to enhance the efficiency of the transportation system, improve access, and facilitate placemaking.

The Mobility Plan uses wayfinding and route signage as an essential component of multimodal planning elements beyond construction of a continuous, interconnected network of multimodal improvements. The Town has already undertaken development of a wayfinding program known as "Live. Love. Lead" around Town Hall and other local destinations.

Wayfinding can be both physical and virtual tools that provide predictability and consistency in the way people find their point of interests around town. The approach to any project begins with understanding community needs and the environment; to help people get familiarized with the surroundings and provide guidance to destinations. Locations of significant landmarks, historic sites and architectural buildings are examples of destinations. At these locations, a simple sign or symbol is preferred but must be distinctive. When visitors return, their experience will be enhanced as they discover by themselves how to navigate. A beneficial wayfinding system not only makes a positive impact on first-time visits but also on following visits.

The following criteria are priorities for phased implementation to develop a effective implementation schedule:

- Visioning and Public Meeting of preliminary recommendations
- Design a memo and specifications
- Develop a location plan
- Develop a funding strategy and project phasing



NEXT STEPS

The following best practices will assist the Town to provide seamless wayfinding that addresses all modes of transportation starting with pedestrians:

Destinations can be conveyed with walking information deployed in stations and other digital tools utilizing and leveraging technology to quickly obtain information through modal integration.

A strategic deployment of a single standard that is unique to the district allowing for content that is unique to the area through local distinctiveness.

Design for All by developing a plan that prioritizes safety with accessibility as the focal point.

4 DEVELOP AND IMPLEMENT A RESIDENTIAL TRAFFIC CALMING PROGRAM

It is recommended that the Town of Lake Park develop a Residential Traffic Calming Program, implemented by ordinance, to reduce vehicle speeds, improve safety for vulnerable road users, and enhance quality of life for all people in Lake Park.

The Town should develop a Residential Traffic Calming Program and Ordinance as a next-step program to the Mobility Plan. The limits of the Residential Traffic Calming Program should be Northlake Blvd to the north, 2nd Street to the east, Silver Beach Road to the south, and the Florida East Coast (FEC) Railroad to the west. The purpose of the Residential Traffic Calming Program prioritizes the safe and efficient movement of people bicycling, walking, and accessing transit by reducing motor vehicle speeds.

Traffic calming is a low-impact, low-cost solution to achieving Complete Streets within the local roadway network. As a strategy it can reduce the negative impacts that motor vehicles often have on other road users. It is effective in many communities where traditional road design or the land development regulations of an area have resulted in the unintended consequence of cut-through traffic and speeding. Traffic calming has been found to be very effective in altering driver behavior for any street network.

The goals of traffic calming are:

1. Reduce vehicle traffic and speeds on local roads
2. Enhance quality of life for residents and visitors
3. Reduce crashes and improve safety

The Residential Traffic Calming Program should establish various horizontal and vertical traffic calming elements to be implemented. Potential horizontal elements include using pavement markings to designate on-street parking, on-street bike / multimodal lanes, and to narrow effective travel lane widths to slow cars down, and street murals. The Residential Traffic Calming Program should also establish criteria for vertical elements such as divided medians, chicanes, speed bumps / tables, chokers, raised intersections, or curb extensions. A balance of horizontal and vertical devices along with intersection treatments such as roundabouts or traffic circles are effective in maintaining residential access, while reducing cut-through traffic and lowering vehicle speeds. It is recommended that the Residential Traffic Calming Program also establish prioritization criteria, study parameters, and neighborhood outreach to determine cost feasibility and preferences of traffic calming devices.

Other traffic calming design considerations include:

Target speed of 20 MPH

The most effective distance between traffic calming devices is 300-500 feet

Traffic calming devices should not be less than 150 feet from an intersection or bridge

To formalize the program, the Town should adopt a Traffic Calming Ordinance , develop a Traffic Calming Advisory Committee composed of technical and public stakeholders, and allocate funding to this program. Residents will have step by step instructions on submitting a petition to the Town Public Works Department. The combination of program elements provides a formal process to assess community requests, provides for technical determination of feasibility, and develops a traffic calming device menu.

5 INITIATE CORRIDOR PLANNING

It is recommended that the Town of Lake Park fund and program preliminary planning and engineering studies for select projects to ensure project feasibility.

Mobility Plan project recommendations should be prioritized and programmed for implementation into the Town's Capital Improvements Plan. To ensure project feasibility, the Town should invest in funding preliminary planning and engineering studies. Steps for Corridor Planning involve a process of assessing what data, decisions and relationships need to be considered, acquired or made throughout the corridor planning process. Projects that need additional Corridor Planning include, but are not limited to.

10th Street North Complete Street

Park Avenue Curbless Main Street

Park Avenue Two-Lane Divided Complete Street

Flagler Boulevard Two-Lane Divided Complete Street

Silver Beach Two-Lane Divided Complete Street

The Town may benefit in developing a Corridor Planning Checklist to highlight risks and funding opportunities. Per F.S. 163.317, a Capital Improvement Plan is to be reviewed by the local government on an annual basis, the corridor planning phase can be identified as an initial phase of an unfunded project. The Town should provide detailed information about the proposed project through a Corridor Planning Development process:

- **Project location / Project limits / Project length**
- **Project Purpose**
- **Existing posted speed and target speed with anticipated changes in posted speed limits and design speeds**
- **Consistency of the proposed project with the applicable Long-Range Transportation Plan (LRTP), Transportation Improvement Program (TIP), Transit Development Plan (TDP), Comprehensive Plan, master plans, visions, and Complete Streets Initiatives.**
- **Safety Analysis**
  - *Impact on school crossing locations and midblock crossing*
  - *Case-specific special considerations to be determined (e.g., Railroad Crossing improvements)*
- **Proposed change in lane configuration - typical sections development**
  - *Proposed use(s) for the right-of-way after the lanes are eliminated (e.g., widened sidewalks, bicycle lanes, landscaping, on-street parking, and transit lanes)*
  - *Impact on bicycle/pedestrian infrastructure and connectivity*
  - *Impact on parking*
  - *Impact on transit routes, stop locations (including appropriateness of turn radii and lane widths), include total number of stops and routes in the area*
  - *Utilities coordination, proposed utilities upgrade and capital improvement projects, development projects, etc.*
- **Public Involvement, agency outreach, and endorsement - plan for obtaining input and review from businesses, residents, and other stakeholders**
- **Project estimate, funding source and schedule**

NEXT STEPS

OTHER CONSIDERATIONS

Additional priorities also emerged from residents and Town leadership during the planning process. The following recommended programs address trends in mobility planning and placemaking and will facilitate the effective implementation of the proposed multimodal projects in the Mobility Plan.

ADOPT A MICROMOBILITY AND LOW SPEED ELECTRIC VEHICLE PROGRAM

It is recommended that the Town of Lake Park adopt a Micromobility and Low Speed Electric Vehicle Program by ordinance to support and facilitate the use of new mobility technologies to provide mobility options to people of all ages and abilities.

New mobility technology, such as micromobility devices (e.g. electric bikes, electric scooters, hoverboards) and low speed electric vehicles (e.g. golf carts, neighborhood electric vehicles, microtransit) have become popular ways of moving around cities and towns in recent years. These new mobility technologies are fun and creative. Micromobility can serve to provide more viable transportation options for the elderly and mobility challenged community members over traditional people-powered modes. In the Florida heat, these technologies also provide cooler, less physically burdensome alternatives to move around.

Developing an ordinance and program will help identify local network capabilities and locations where devices can be used safely and stored. The ordinance and program should regulate the use of micromobility devices and low speed electric vehicles within the Town. The Town should coordinate with FDOT regarding use of these devices on and crossing US Highway 1 and Northlake Blvd. The Town should also coordinate with Palm Beach County, Palm Beach Gardens, Riviera Beach, and North Palm Beach regarding use of micromobility devices and low speed electric vehicles on and crossing County Roads and within adjacent municipalities. The Program and ordinance should address hours of operation, safety, shared mobility providers, rentals, and equipment.

IMPLEMENT A GREEN ALLEYS PROGRAM

It is recommended that the Town of Lake Park implement a "Green Alleys Program" to repurpose Town right-of-way in utility easements behind residential properties to provide new public space and multimodal connections throughout the community.

The Town could consider a study to explore development of a Green Alleys Program to repurpose Town owned open space located in utility easements that would connect residential neighborhoods. The "alleys" should be open to bicycle and pedestrian flows only (quiet modes) and could include landscaping, urban gardens, open space areas, benches, picnic tables and other elements. The alleys then become a public amenities that can be utilized by residents to enhance connectivity. The Town may also consider developing a volunteer Green Alleys Community Board to oversee maintenance, manage funding, determine what the space can be used for and potentially develop programming for the space (e.g. pop-up markets, block parties, yoga classes, urban gardens, etc.).

Further Reading:

A technical report is being prepared for documenting the mobility fee

NUE URBAN CONCEPTS
LAND USE · MOBILITY · PARKING · FEES

THE REPUBLIC OF DESIGN INC.

DDEC

futureplan

MOBILITY COHORT

Exhibit "B"


TOWN OF LAKE PARK, FLORIDA
1923
TOWN OF LAKE PARK
MOBILITY PLAN
NOVEMBER 7th, 2022
MOBILITY COHORT

Agenda

Mobility Plan and Fee

- What is a Mobility Plan & Fee?
- Why do we need it?
- Mobility Plan Approach: Moving People
- Draft Lake Park 2045 Mobility Plan & Proposed Concepts
- Mobility Fee Calculation
- Next Steps

What is a Mobility Plan?

- **A Mobility Plan** is a 20 year vision of the Town's transportation system to transition from one focused primarily on moving vehicles to moving people.
- **Mobility Plans** create a balance between reducing congestion and support community growth.
- **Mobility Plans** are required by Florida Statute to serve as the basis for development of a **Mobility Fee.**

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Why do we need it?

A **Mobility Plan** is the basis to establish a Mobility Fee.

A Mobility Plan assists the Town in prioritizing projects in their long range plans and helps get projects funded

Mobility fees, established through mobility plans, create additional revenue that the Town can use to fund mobility projects.

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Moving People

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MULTIMODAL ELEMENTS

Mobility
Ability to move people by multiple modes of travel in a timely and efficient manner.

Accessibility
Ease at which people use modes of travel to reach jobs, daily needs, and social activities.

Connectivity
Number of route options available to move people and the directness of those route options to reach their destination .

Visibility
Frequency at which those driving a car see people walking, bicycling, and using a mode of travel other than driving a car.

Safety
Behavioral and physical design elements of the built environment that allow people of all ages and abilities to reach their destination safely.

Social Value
Experiences and interactions in a shared space environment can increase individual and societal happiness.

Continuity
Uninterrupted consistency of multimodal facilities in width and condition with logical beginning and endpoints that are without gaps or sudden and abrupt termination.

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Moving Towards Safety

10-15MPH

20-30MPH

30MPH +

Design for Safe Speed

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What are Complete Streets?

WHAT IS A COMPLETE STREET? DDEC

A Complete Streets approach integrates people and place in the planning, design, construction, operation, and maintenance of our transportation networks.

ACTIVE SIDEWALKS
Sidewalks should be smooth, wide,feel safe, and have **Appropriate transitions** to the street, making **them easy to walk or use** a wheelchair on.

DEDICATED BIKE LANES
Simple pavement markings creating a dedicated bike lane make both motorist and bicycle movement more predictable, and **therefore safer for both.** They may increase the likelihood of casual riders using bicycles **for transportation.**

ACTIVE ROADWAY
One lane of car traffic going in each direction with a two-way-left-turn-lane (TWLTL) in the center would reduce the amount of car crashes on Government Street by providing turning vehicles a refuge from through traffic, while keeping through traffic moving more efficiently.

SAFE CROSSWALKS
Crealy marked crosswalks allow pedestrians and wheelchair users to cross streets safely, while making sure cars know where to expect them.

FURNISHING ZONE
The street furniture zone is defined as the section of the sidewalk between the curb and the through zone in which street furniture and amenities, such as lighting, benches, newspaper kiosks, utility poles, tree pits, and bicycle parking are provided. The street furniture zone may also consist of green infrastructure elements, such as rain gardens or **flow-through planters.**

Green Spaces
Parks and public green spaces create a destination, encouraging community interaction and providing a rest from the surrounding urban environment.

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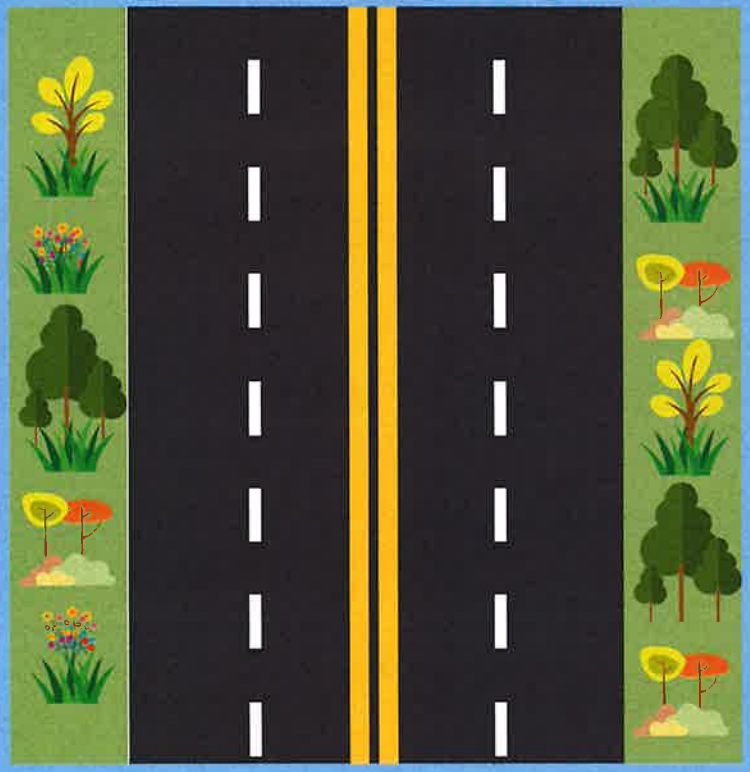
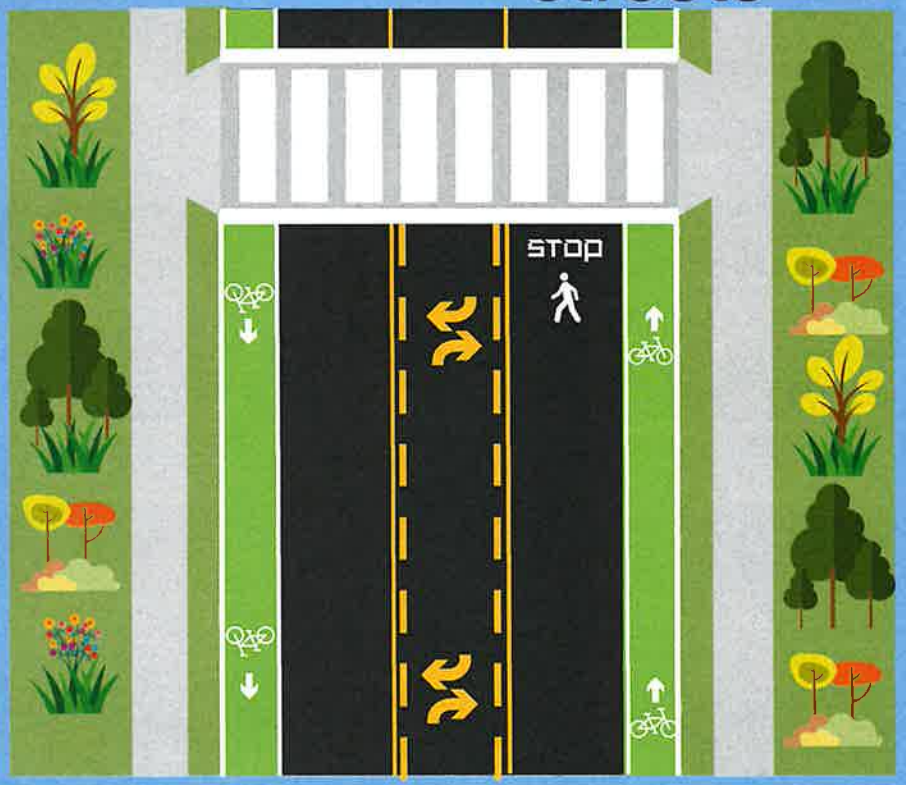
Before Complete Streets



After Complete Streets



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How Can a Mobility Plan Help The Town of Lake Park?

Improve Safety

Reduce Speed

Improve Access

Complete Streets

Enhance Community

Capital Improvements

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OCTOBER 2022 *MODIFIED: 26OCT2022*

2045 LAKE PARK MOBILITY PLAN

DRAFT

- LAKE PARK GREENWAY
- WATERFRONT PROMENADE
- TWO (2) LANE DIVIDED COMPLETE STREET
- PARK AVE CURBLESS MAIN STREET
- NEW FUTURE TWO (2) LANE ROAD
- NEW FUTURE TWO (2) LANE ROAD (TO BE CONSTRUCTED BY NEW DEVELOPMENT/ REDEVELOPMENT)
- RESIDENTIAL TRAFFIC CALMING PROGRAM
- FEDERAL HIGHWAY MIXED-USE OVERLAY DISTRICT (FHMUDO)

STREET IMPROVEMENTS

- MULTIMODAL IMPROVEMENT
- COMPLETE STREET
- PRIORITY RESIDENTIAL TRAFFIC CALMING STREET (DESIGN TBD BASED ON FURTHER EVALUATION)

CROSSING IMPROVEMENTS

- INTERSECTION IMPROVEMENT
- ROUNDABOUT
- SIGNALIZED ROUNDABOUT
- HIGH-INTENSITY ACTIVATED CROSSWALK (HAWK)
- HIGH VISIBILITY CROSSWALK
- RECTANGULAR RAPID FLASHING BEACON (RRFB)
- TRAIN STATION
- BOAT UNDERPASS

1 * *#15, 17, 24, 26, 55A, 62 - PROJECT REQUIRES RIGHT-OF-WAY FROM PRIVATELY-OWNED PROPERTY*

2 * *#13, 27 - PROJECT REQUIRES UTILITY EASEMENT*

3 * *#64 - PROJECT REQUIRES RIGHT-OF-WAY OWNED BY PALM BEACH COUNTY*

4 * *#1, 2, 3, 7, 13, 27, 73, 76, 106 - ENTIRELY OR PARTIALLY LOCATED OUTSIDE LAKE PARK TOWN LIMITS*

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Proposed Concepts

Multimodal Improvements

- Sidewalks
- Shared-Use Paths
- Bike / Multimodal Lanes

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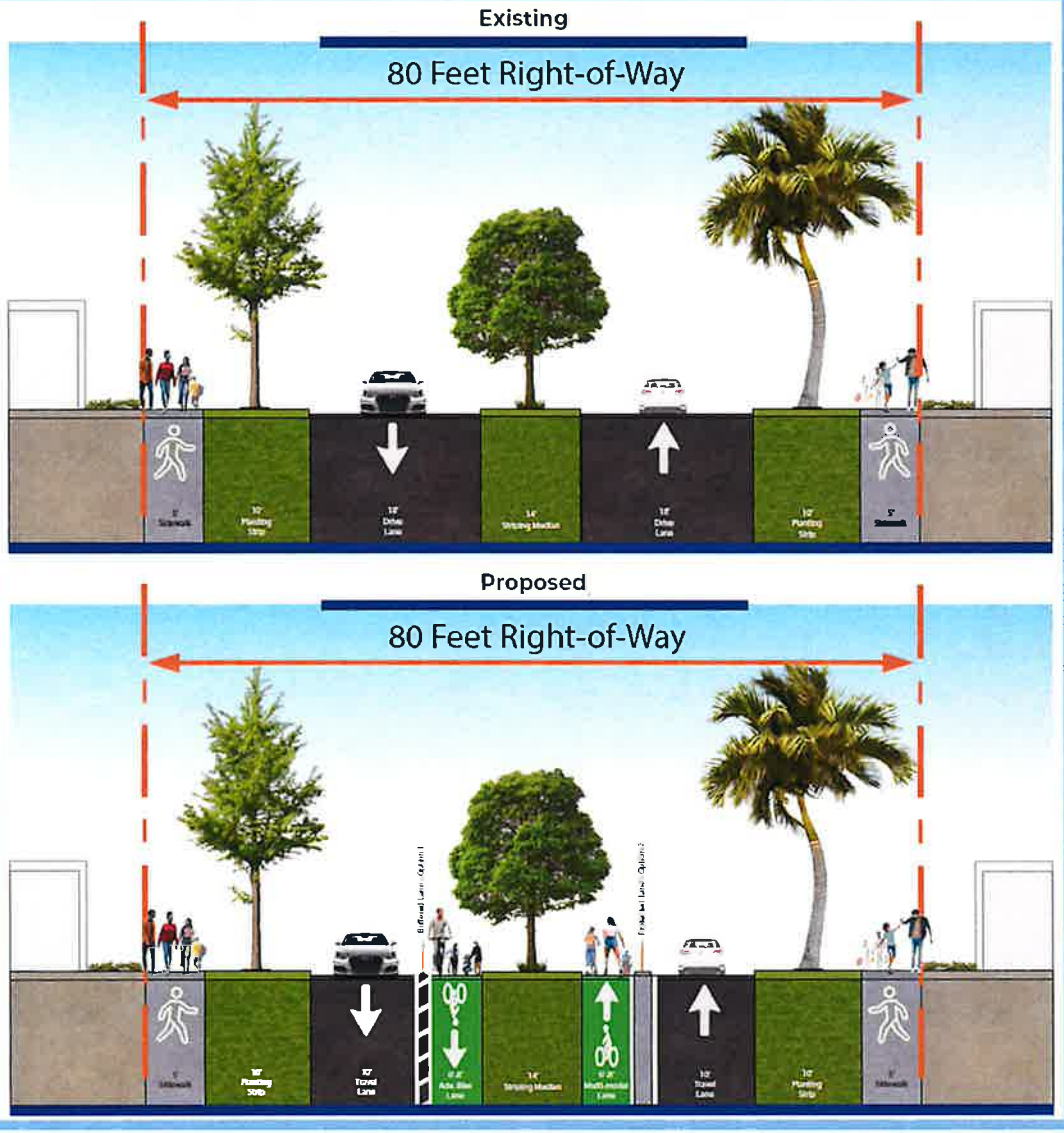


Typical Section Flagler Blvd.

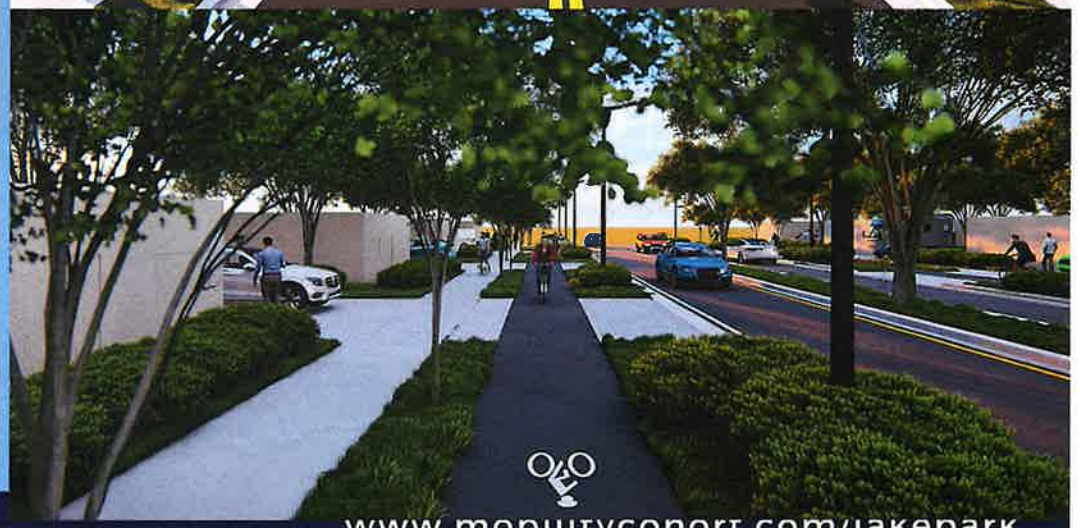
Location: Palmetto Dr. to Northlake
Roadway Classification: Collector
Existing Speed Limit: 25MPH
Proposed Speed Limit: 20MPH
Length: 1.0 Mi

Proposed Recommendations:
restripe existing travel lanes with buffered and/or protected bike lanes

Proposed Concepts

Complete Streets

- Two-Lane Divided
  - Park Ave, Flagler Blvd, 5th St, 6th St, Silver Beach Rd
- New, Future Two-Lane Road
- Developer Driven, New Future Two Lane Road



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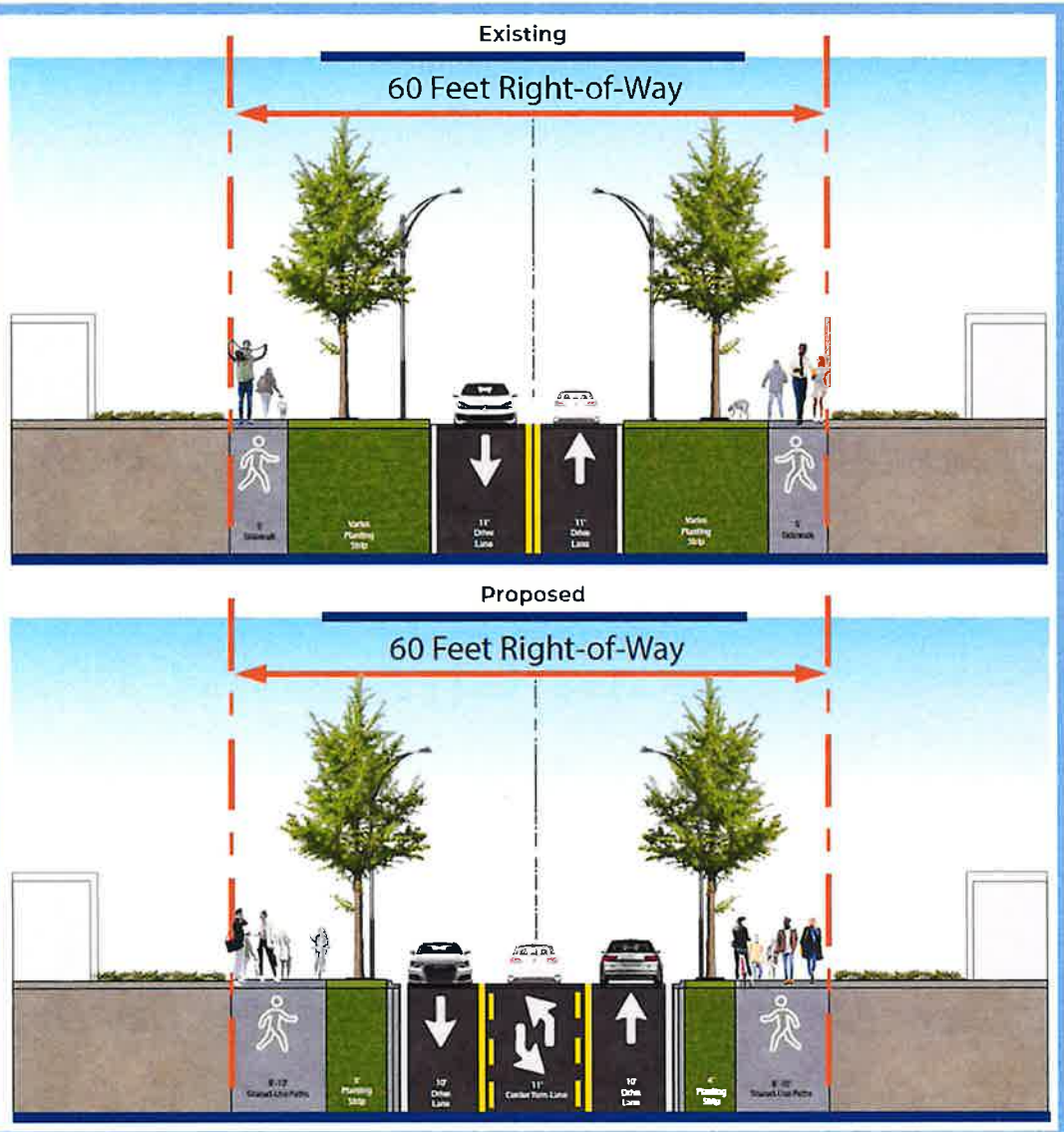

Typical Section Silverbeach Rd.

Location: US-1 - 10th Street
Roadway Classification: Collector
Existing Speed Limit: 30MPH
Proposed Speed Limit: 25MPH
Length: 1.0 Mi

Proposed Recommendations: road widening from 2-lanes to 3-lane with center turn lanes and shared use paths

Proposed Concepts

Traffic Calming

- Yield Streets
- Speed humps / tables
- Road restriping (narrowing)
- Chicanes
- Curb extensions

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Yield Streets

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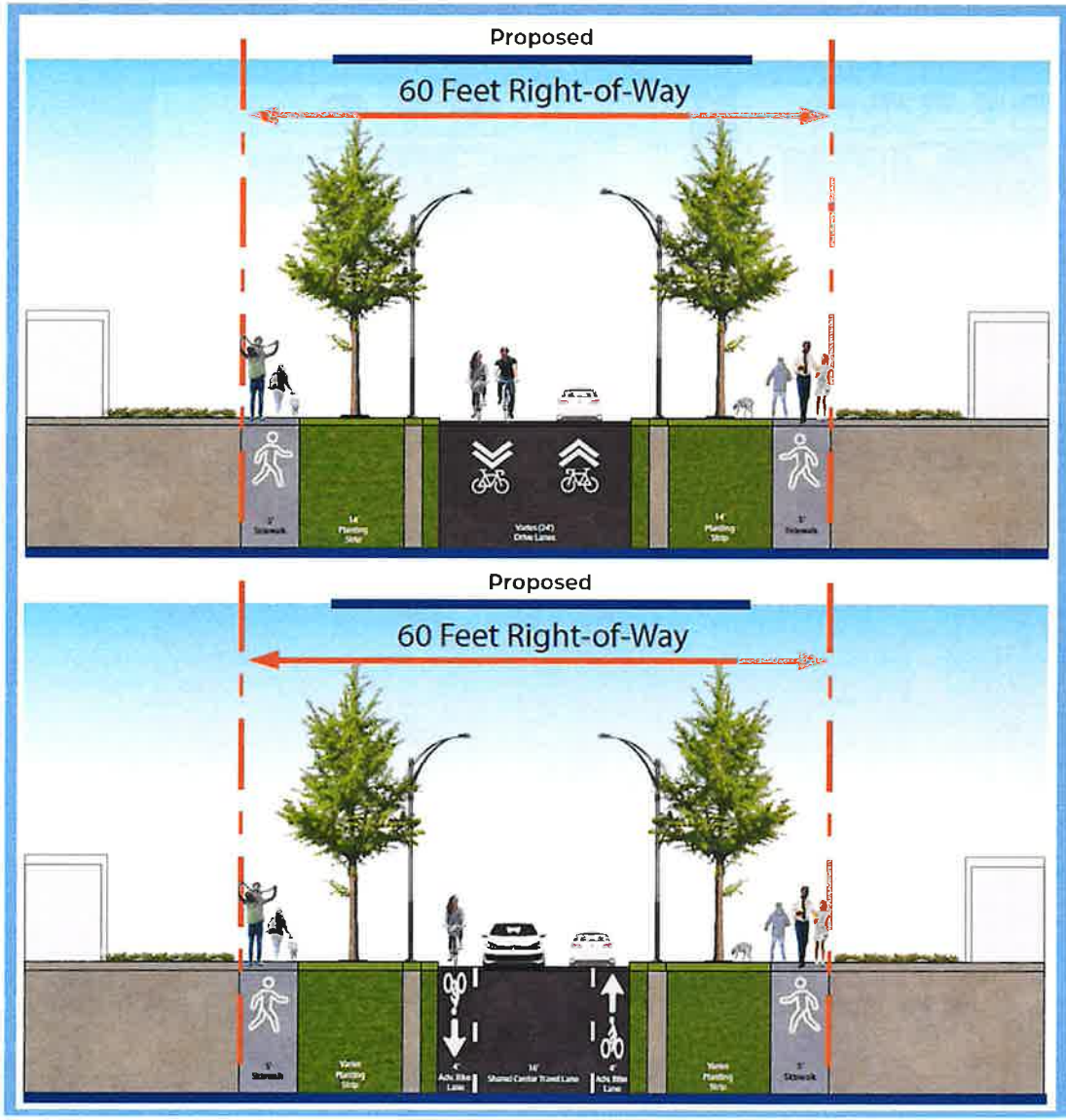

Typical Section Low Speed Streets

Location: Varies
Roadway Classification: Local
Existing Speed Limit: 25MPH
Proposed Speed Limit: 20MPH
Length: Varies

Proposed Recommendations:
neighborhood low speed street with on street shared lanes or advisory bike lanes and traffic calmed.

Proposed Concepts

Pedestrian Crossings

- Rectangular Rapid Flashing Beacon (RRFB)
- High-Intensity Activated Crosswalk (HAWK)
- High Visibility Crosswalk

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Proposed Concepts

Intersections

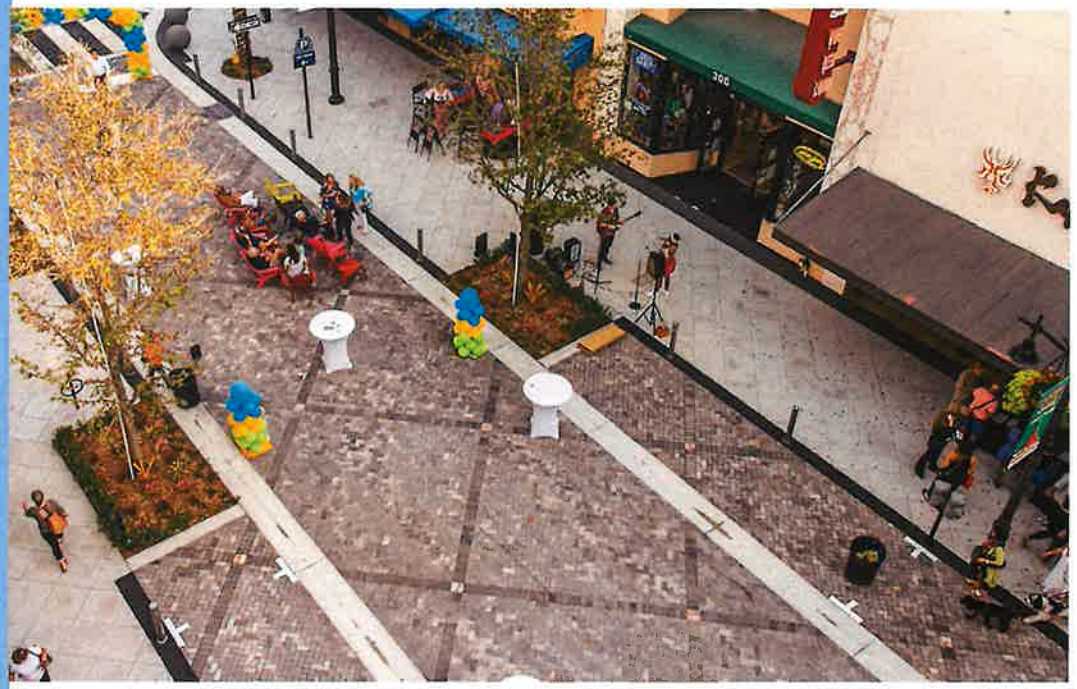
- Intersection Improvements
- Roundabouts
- Signalized Roundabouts

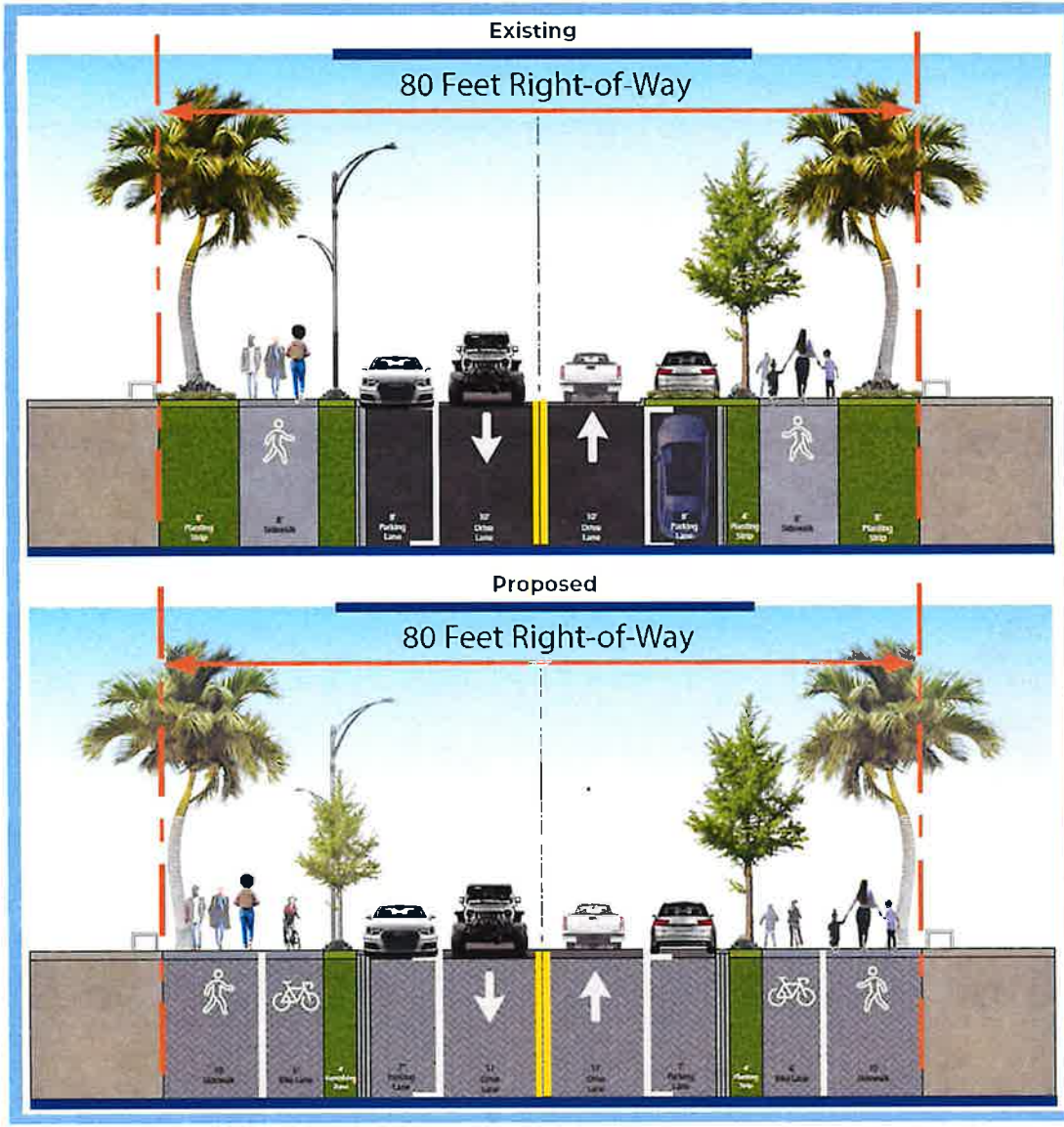
Special Projects

Proposed Concepts

Park Ave. Curbless Shared Street

- Reimagine downtown
- Placemaking
- Walkable, people-friendly
- Safer street environment





Typical Section Park Ave.

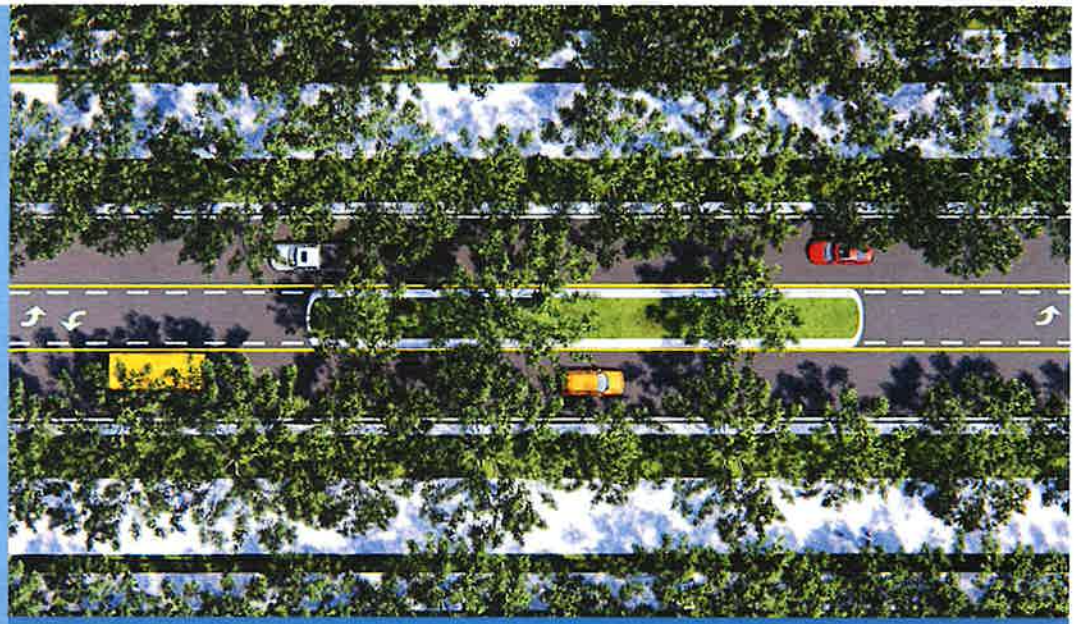
Location: 7th Street to 10th Street
Roadway Classification: Collector
Existing Speed Limit: 25MPH
Proposed Speed Limit: 20MPH
Length: 0.4Mi

Proposed Recommendations: low speed curbless shared street with on-street parking and wide multimodal lanes

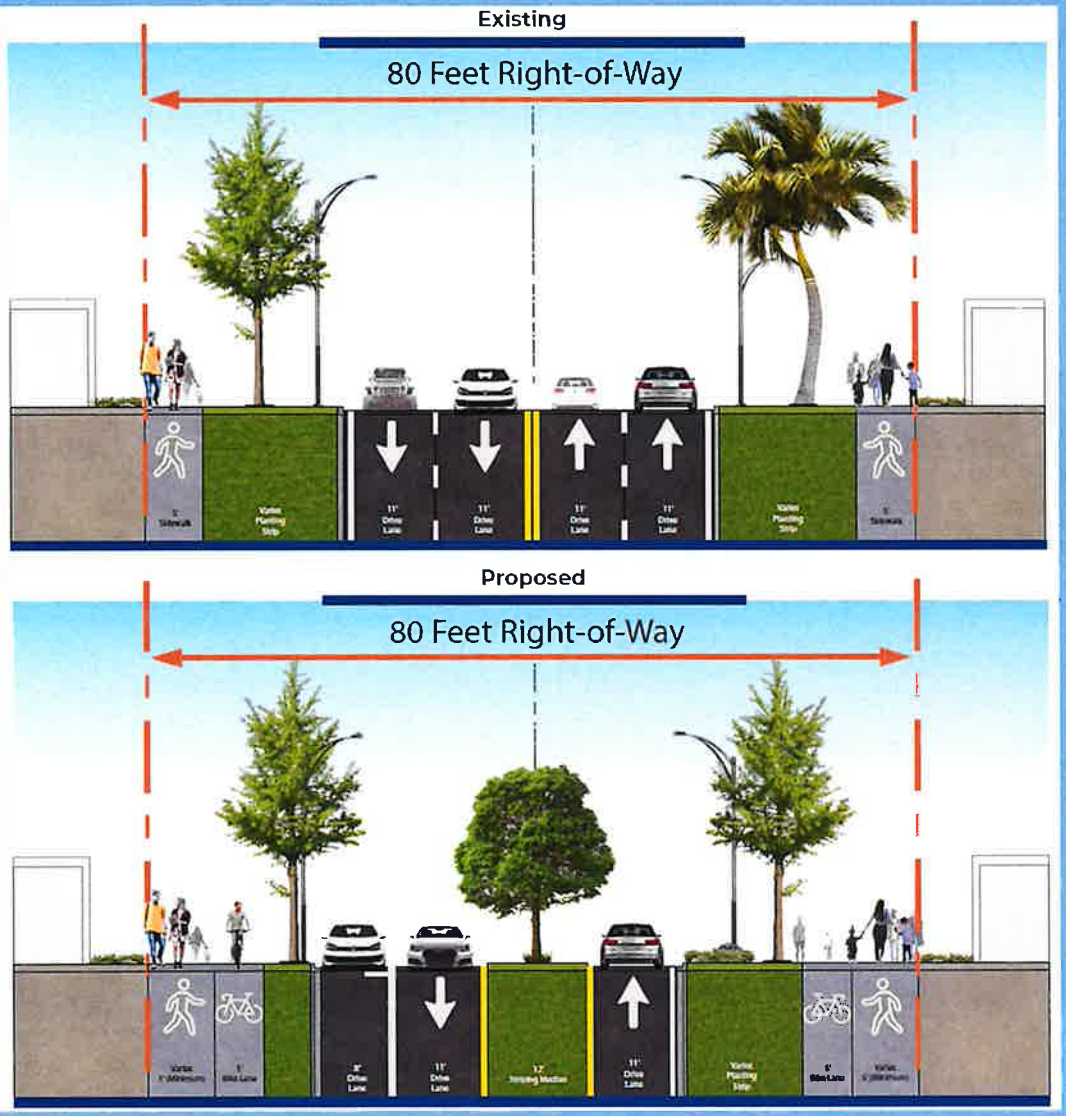
Proposed Concepts

Park Ave. Reimagined

- Remove 2-lanes of traffic
- 10' wide Shared-Use Paths
- Add on-street parking
- Gateway to downtown Lake Park



www.mobilitycohort.com/lakepark



Typical Section Park Ave. East

Location: US-1 - 7th Street
Roadway Classification: Collector
Existing Speed Limit: 25MPH
Proposed Speed Limit: 20MPH
Length: 0.7Mi

Proposed Recommendations: Lane repurposing from 4-lanes to 2-lane divided with median and shared-use paths

Proposed Concepts

Waterfront Promenade

- Community gathering place
- Protection from environmental degradation of sea wall

Proposed Concepts

Lake Park Greenway

- C-17 Canal ROW
- South Florida Water Management District
- Requires raising canal bank

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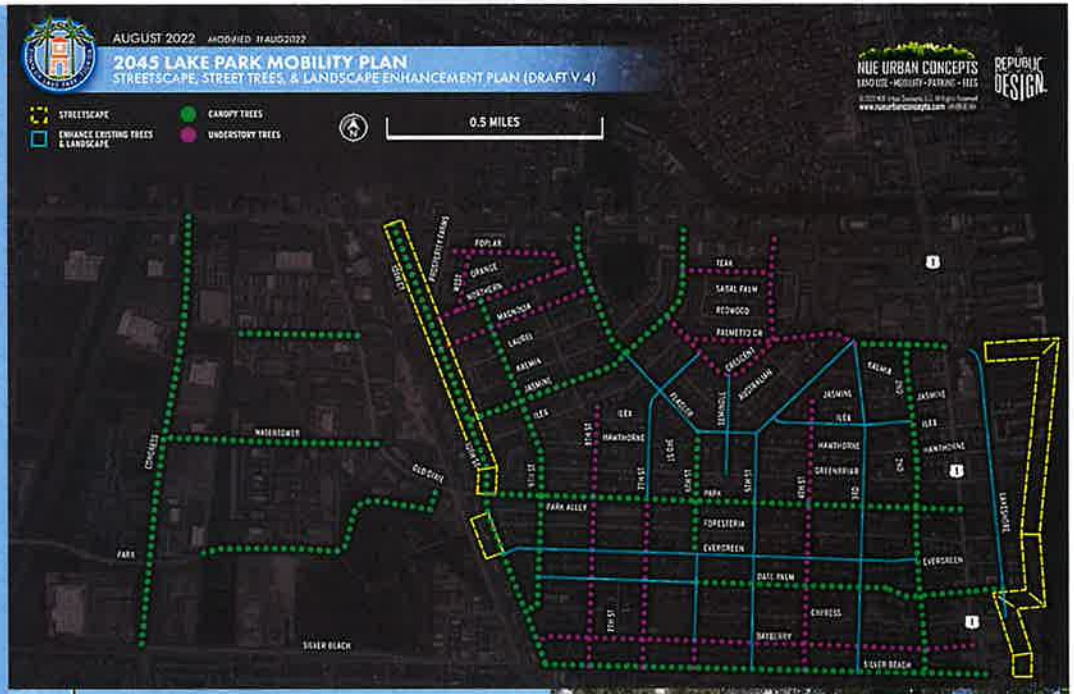
Special Programs

Proposed Concepts

Next Step Programs

- Residential Traffic Calming Program
- Streetscape, Street Trees & Landscape Enhancement Plan
- Green Alleys Program
- Transit Stop Program
- Wayfinding Program
- Corridor Planning



www.mobilitycohort.com/lakepark

Special Considerations

Requires private ROW

- Watertower Road extension (15)
- Congress to Lake Park Greenway (17)
- Killian Drive Extension (24 & 26)
- Opening of Teak Drive to Twin Cities Mixed Use District (55A)
- Waterfront Promenade (62)

Requires utility easement

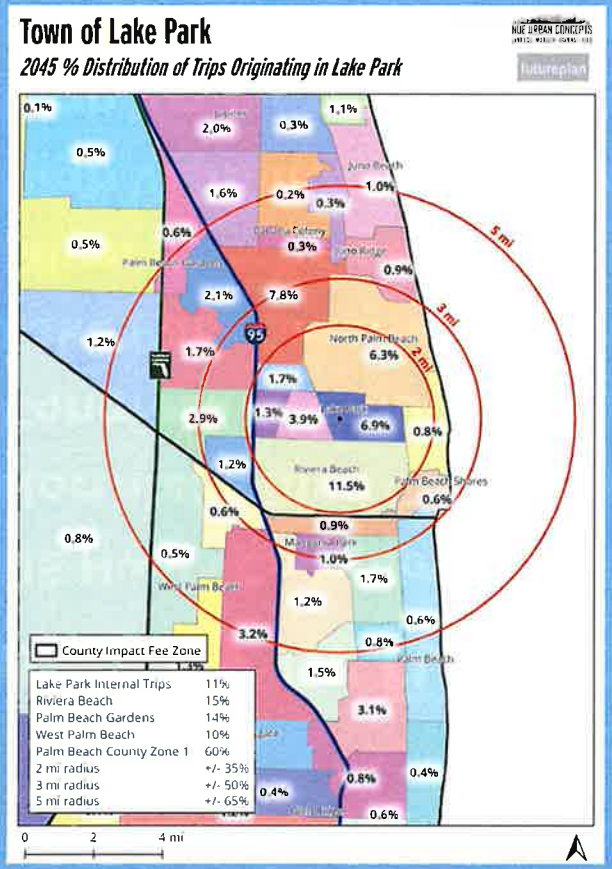
- Lake Park Greenway (SFWMD) (13)
- Silver Beach Road extension (SFWMD) (27)

Special Considerations

Partially or fully outside town limits

- US Hwy 1 Complete Street (1)
- Northlake Blvd Complete Street (2,3)
- Congress Ave Multimodal Improvement (7)
- Lake Park Greenway (13)
- Silver Beach Road Extension (27)
- High Visibility Crosswalk at Northlake Blvd & Congress Ave (73)
- High Visibility Crosswalk at Northlake Blvd * US Hwy 1 (76)
- Intersection Improvements at Silver Beach Road Ext & Garden Rd (106)

Mobility Fee - Trip Distribution



Districts	DISTRICT NAME	Number of trips from Lake Park	% of trips from Lake Park
68	Riveria Beach Area Central	2713.66	9.8%
60	PBG Central East	2569.85	9.3%
41	Lake Park East	2126.15	7.7%
51	North Palm Beach	1878.55	6.8%
42	Lake Park West	1062.39	3.8%
115	WPB West Z2	949.8	3.4%
107	West Palm Beach CMA	948.14	3.4%
55	Northlake PBG SW	905.51	3.3%
62	PBG Central West	660.5	2.4%
54	Northlake PBG SE	547.95	2.0%

www.mobilitycohort.com/lakepark

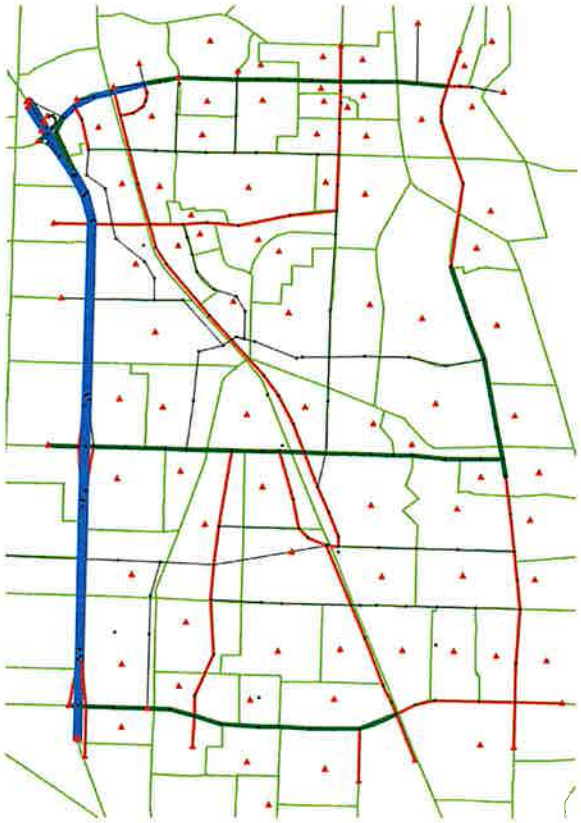
How is a Mobility Fee Calculated

Mobility Plan Project Cost: $105,592,020
Mobility Plan Intersection Cost: $23,352,315
Mobility Plan Total Cost: $128,944,335

Mobility Plan Project Person Capacity: 284,808
Mobility Plan Intersection Person Capacity: 103,100
Mobility Plan Total Person Capacity: 387,908

*Subject to change when plan is finalized

MODEL NETWORK



How is a Mobility Fee Calculated

- **Base Year (2022) VMT: 775,247**
- **Base Year (2022) PMT: 1,403,197**
- **Plan Year (2045) VMT: 952,923**
- **Plan Year (2045) PMT: 1,724,791**

VMT INCREASE (2022-2045): 177,676
PMT INCREASE (2022-2045): 321,594

How is a Mobility Fee Calculated

Person Miles of Travel Increase:	321,594
Person Miles of Capacity Increase:	387,908
New Growth Share of Capacity:	83%
Draft Unfunded Mobility Plan Cost:	$67,247,892
New Growth Share of Cost:	$55,748,502
Person Miles of Capacity Increase:	387,908
Person Miles of Capacity Rate:	$143.72

Mobility Fee Estimate

Use Categories, Use Classifications, and Representative Uses	Unit of Measure	Mobility Fee	Unit of Measure	Mobility Fee
Residential / Lodging Uses				
Affordable, Attainable or Workforce Residential	per sq. ft.	$0.43	per 1,000 sq. ft.	$ 431
Residential	per sq. ft.	$0.86	per 1,000 sq. ft.	$ 861
Overnight Lodging (Hotel, Inn, Motel, Resort)	per room	$ 971	per room	$ 971
Mobile Residence (Mobile Home, Recreational Vehicle, Travel Trailer)	per space or lot	$ 633	per space or lot	$633
Institutional Uses				
Community Serving (Civic, Museum, Performing Arts, Place of Assembly or Worship)	per sq. ft.	$ 0.82	per 1,000 sq. ft.	$ 823
Long Term Care (Assisted Living, Congregate Care Facility, Nursing Facility)	per sq. ft.	$0.47	per 1,000 sq. ft.	$ 474
Private Education (Day Care, Private Primary School, Pre-K)	per sq. ft.	$ 0.64	per 1,000 sq. ft.	$ 643

Mobility Fee Estimate

Use Categories, Use Classifications, and Representative Uses	Unit of Measure	Mobility Fee	Unit of Measure	Mobility Fee
Industrial Uses				
Industrial (Assembly, Brewing, Distilling, Distribution, Fabrication, Flex Space, Manufacturing, Nursery, Outdoor Storage, Processing, Trades, Warehouse, Utilities)	per sq. ft.	$ 0.63	per 1,000 sq. ft.	$627
Industrial (Distribution, Fulfillment, Nursery, Outdoor Storage, Storage, Warehouse)	per sq. ft.	$0.23	per 1,000 sq. ft.	$232
Recreational Uses				
Marina (Including dry storage)	per acre	$ 358	per acre	$ 358
Outdoor Commercial Recreation (Amusement, Golf, Multi-Purpose, Parks, Sports, Tennis)	per acre	$ 1,812	per acre	$ 1,812
Indoor Commercial Recreation (Dance, Gym, Fitness, Indoor Sports, Kids Activities, Yoga)	per sq. ft.	$ 3.43	per 1,000 sq. ft.	$ 3,428
Office Uses				
Office (Dental, General, Higher Education, Hospital, Medical, Professional)	per sq. ft.	$ 1.25	per 1,000 sq. ft.	$ 1,252
Medical Office (Clinic, Dental, Emergency Care, Medical, Veterinary)	per sq. ft.	$3.17	per 1,000 sq. ft.	$ 3,172

Mobility Fee Estimate

Use Categories, Use Classifications, and Representative Uses	Unit of Measure	Mobility Fee	Unit of Measure	Mobility Fee
Commercial & Retail Uses				
Small Retail Business (Entertainment, Restaurant, Retail, Services)	per sq. ft.	$1.14	per 1,000 sq. ft.	$1,139
Retail (Discount, Entertainment, Financial, Retail, Services, Superstore)	per sq. ft.	$2.28	per 1,000 sq. ft.	$2,277
Beverage & Restaurant (Chain and National High Turn-Over & Sit-Down Bar and / or Restaurant	per sq. ft.	$5.08	per 1,000 sq. ft.	$5,079
Convenience Retail (Convenience, Motor Vehicle Charging & Fueling, Quick Service Restaurant)	per sq. ft.	$12.54	per 1,000 sq. ft.	$12,541
Additive Fees for Commercial Services & Retail Uses 9				
Bank Drive-Thru Lane or Free-Standing ATM 10	per lane or ATM	$8,093	per lane or ATM	$8,093
Motor Vehicle & Boat Cleaning (Detailing, Wash, Wax)	per lane or stall	$3,121	per lane or stall	$3,121
Motor Vehicle Charging or Fueling	per charging or fueling position	$3,221	per charging or fueling position	$3,221
Pharmacy Drive-Thru	per lane	$2,646	per lane	$2,646
Quick Service Restaurant Drive-Thru	per lane	$6,139	per lane	$6,139

Next Steps

- Update Mobility Plan based on feedback
- 1st Reading of Mobility Fee Ordinance: December 7

Questions, Comments & Concerns

Jonathan B. Paul, AICP

Visit
www.mobilitycohort.com/lakepark

NUE Urban Concepts
nueurbanconcepts@gmail.com
www.nueurbanconcepts.com
833-NUC-8484

Staff Report

Owner/Applicant:	Town of Lake Park Public Works Department ("Applicant")
Address:	535 Park Avenue ("Property")
Current Zoning:	Public District
FLUM land use category:	Other Public Facilities
Existing uses on site:	Town Hall Offices
Photos of Structure:	See Exhibits
Historic Property Survey 1981:	c. 1927, Municipal Building

SUMMARY OF NEW REQUEST AND BACKGROUND INFORMATION:

The Town's property at 535 Park Avenue was listed in the National Register of Historic Places on September 3, 1981 and has been locally historically designated. The property, constructed in 1927, has served as a municipal building since the Kelsey City Era, a function that it still serves today for Lake Park staff. The structure's notable design features include jack arches, open-bed pediments over the ground floor windows, and a rusticated frontispiece in the center bay of the seven-bay façade.

Because the Applicant is seeking approval to make renovations to existing exterior features of the building that have deteriorated, a special certificate of appropriateness from the Historic Preservation Board is required.

The proposed restoration work includes repairs to the eastern and western balconies, repainting the building exterior, and reroofing the building with new tile. These renovations are proposed because the subject elements have deteriorated and become unsightly or, in the case of the balconies, structurally unsound. The Applicant has provided photo documentation showing where the concrete on the underside of the balconies has succumbed to spalling and chipping, where exterior paint has deteriorated, and where roof tiles have gone missing, exposing the building interior to water damage.

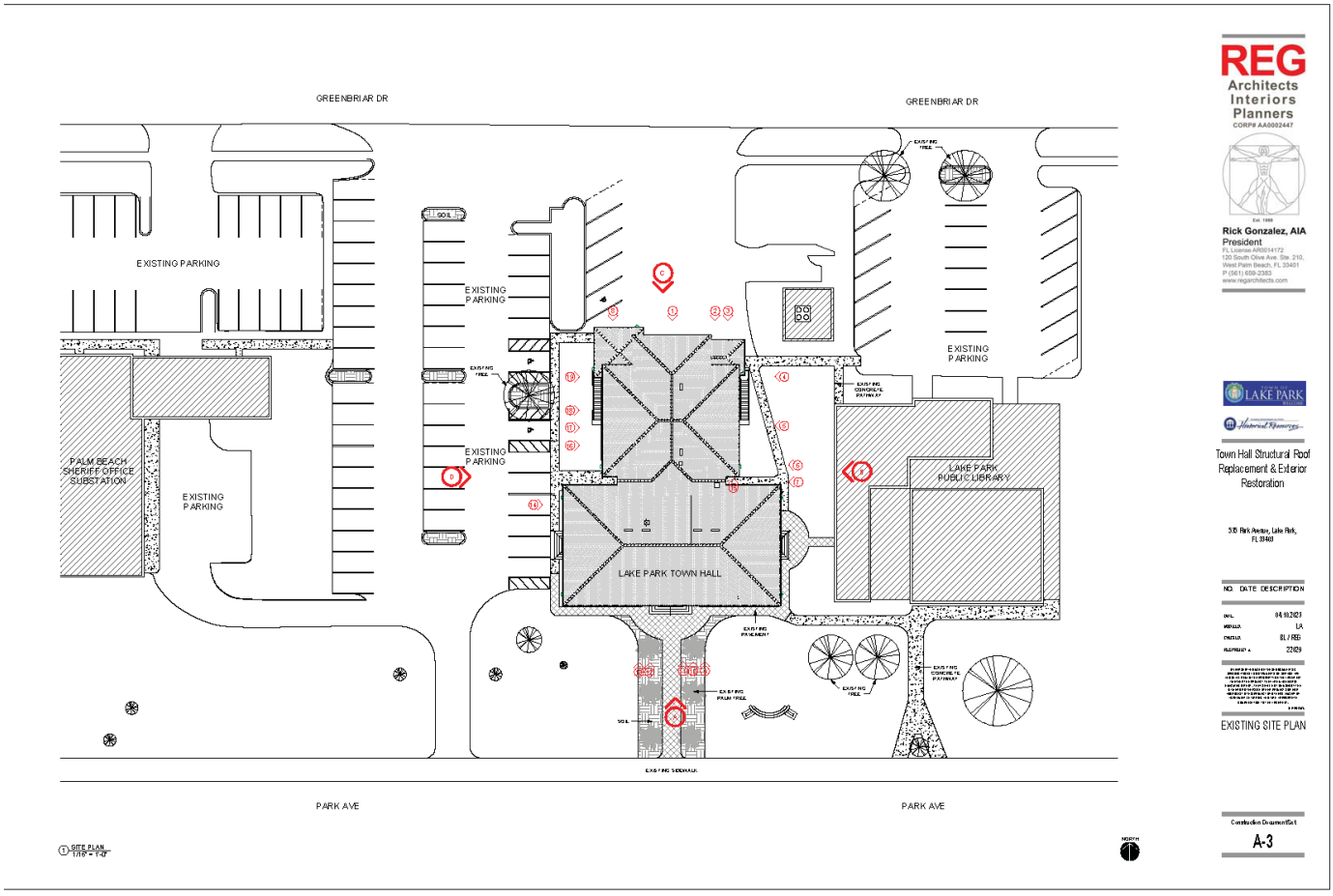
An overview of the areas of concern are illustrated under the Exhibits section below and exhaustively detailed in the Town Hall Reroof and Exterior Restoration plans prepared by the Town's historical architectural consultant, REG, and included in the Applicant's special certificate of appropriateness application packet.

Staff has reviewed the proposed renovations for compliance with our zoning code procedures and has found REG's methodology to be in line with code requirements for a special certificate of appropriateness. All portions of this Application pertaining to actions governed by the Florida Building Code will be subject to building permit review following the approval of this special certificate of appropriateness request.

Staff Report

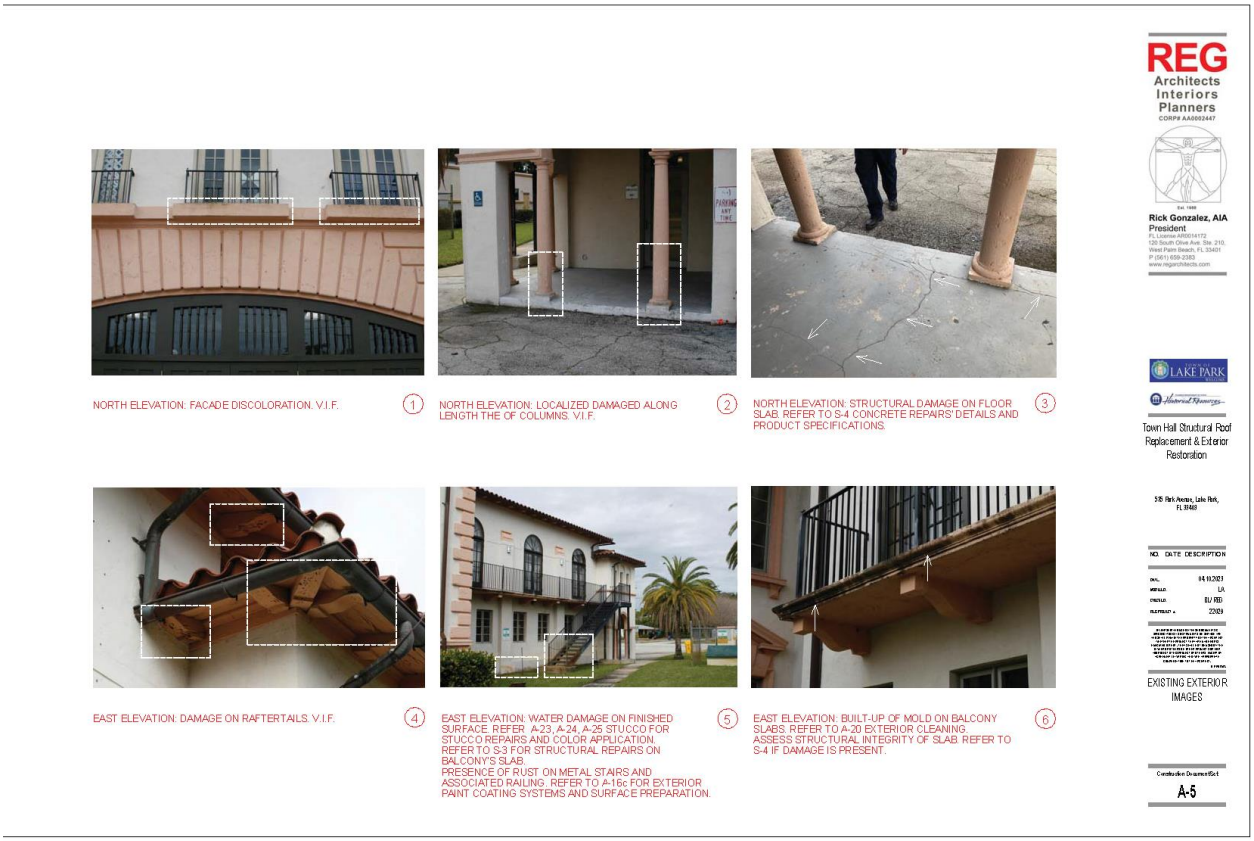
Exhibits

Exhibit A – Site Plan



Staff Report

EXHIBIT B – Existing Conditions



Staff Report

EXHIBIT B – Existing Conditions

EAST ELEVATION: WATERMARKS AND LOCALIZED CLUSTERS OF MOLD. REFER TO A-20 EXTERIOR CLEANING AND A-24 STUCCO FOR STUCCO REPAIR AND COLOR APPLICATION. (7)

SOUTH ELEVATION: ROTTED RAFTER TAIL, CRACKED WINDOW EXTERIOR MOLDING (8)

SOUTH ELEVATION: CHIPPED PAINT ON HEAD CASING, TYP. REFER TO A-21 AND A-22 WINDOWS FOR INSPECTION AND REPAIR GUIDELINES (9)

SOUTH ELEVATION: ASSESS DETERIORATION OF PAINT COAT ON RAFTERTAILS AND REPAIR AS NECESSARY. (10)

SOUTH ELEVATION: BUILD-UP OF MOLD ON LEGDE SURFACE. REFER TO A-20 EXTERIOR CLEANING. (11)

SOUTH ELEVATION: FOREIGN OBJECT EMBEDDED ON RAFTERTAIL. V.I.F. REMOVE AND REPAIR RAFTERTAIL. (12)

SOUTH ELEVATION: DETERIORATION OF PAINT COAT ON RAFTERTAILS. REPAIR AS NECESSARY. (13)

REG
Architects
Interiors
Planners
CORP# AA0002447

Rick Gonzalez, AIA
President

Town Hall Structural Roof Replacement & Exterior Restoration

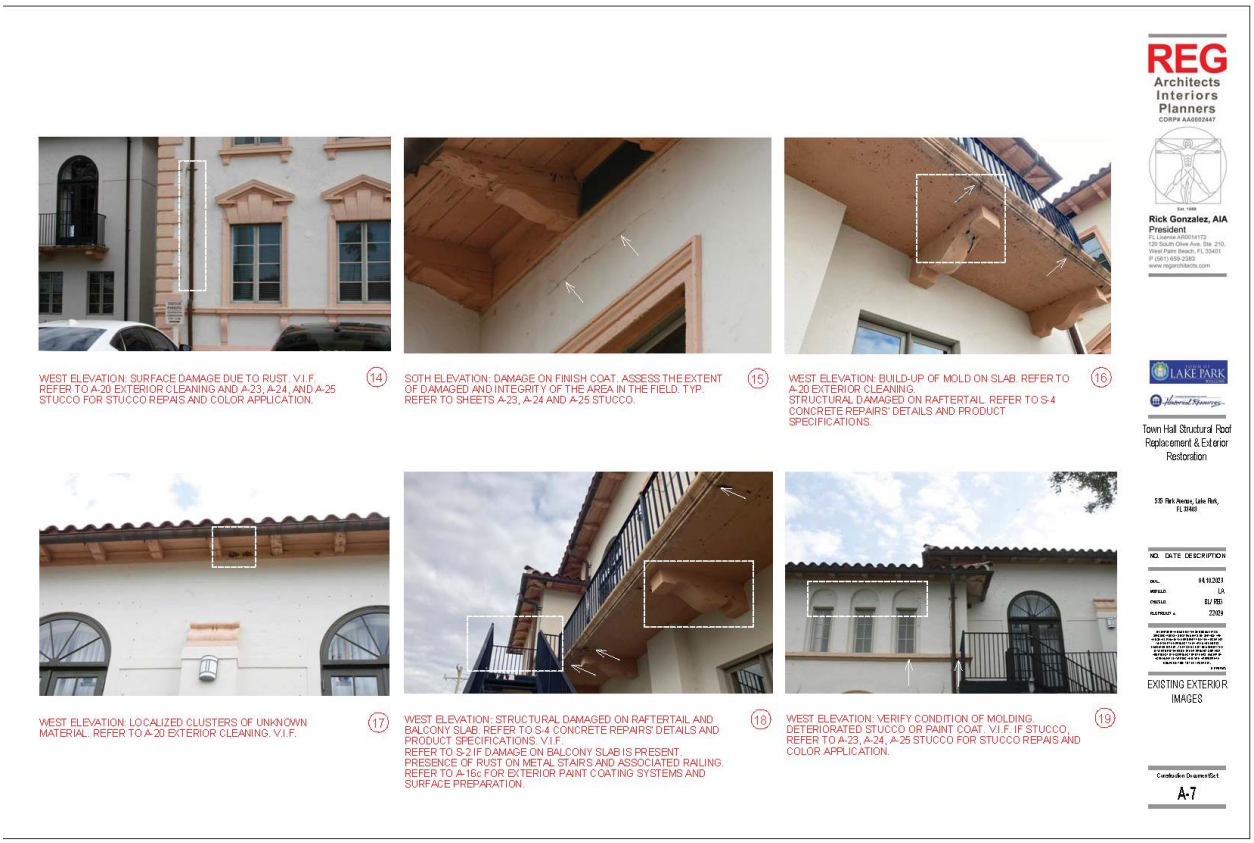
NO. DATE DESCRIPTION

EXISTING EXTERIOR IMAGES

A-6

Staff Report

Exhibit C – Existing Conditions



Staff Report

EXHIBIT D – Existing Conditions

EXISTING ROOF: NORTH AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING NORTH - EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING ROOF CONDITION: NORTH - EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING ROOF CONDITION: EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING ROOF CONDITION: TOP VIEW/
REMOVE ALL VENTS AS REQUIRED.

REG
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Interiors
Planners
CORP# AA0002447

Rick Gonzalez, AIA
President

Town Hall Structural Roof Replacement & Exterior Restoration

NO. DATE DESCRIPTION

EXTERIOR ROOF AERIAL REFERENCE IMAGES

A-8

Staff Report

EXHIBIT E – Existing Conditions

MAIN ENTRANCE: SOUTH AERIAL VIEW ROOF CONDITION, MISSING ROOF TILES.

SOUTH AERIAL ROOF VIEW / MISSING AND CHIPPED ROOF TILES, REMOVE ALL VENTS AS REQUIRED.

SOUTH AERIAL ROOF VIEW / MISSING AND CHIPPED ROOF TILES, REMOVE ALL VENTS AS REQUIRED.

ROOF: SOUTH - WEST AERIAL VIEW, REMOVE ALL VENTS AS REQUIRED.

ROOF CONDITION: WEST AERIAL VIEW, REMOVE ALL VENTS AS REQUIRED.

WEST AERIAL VIEW ROOF CONDITION, REMOVE ALL VENTS AS REQUIRED.

REG
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CORP# AA0002447

Rick Gonzalez, AIA
President

Town Hall Structural Roof Replacement & Exterior Restoration

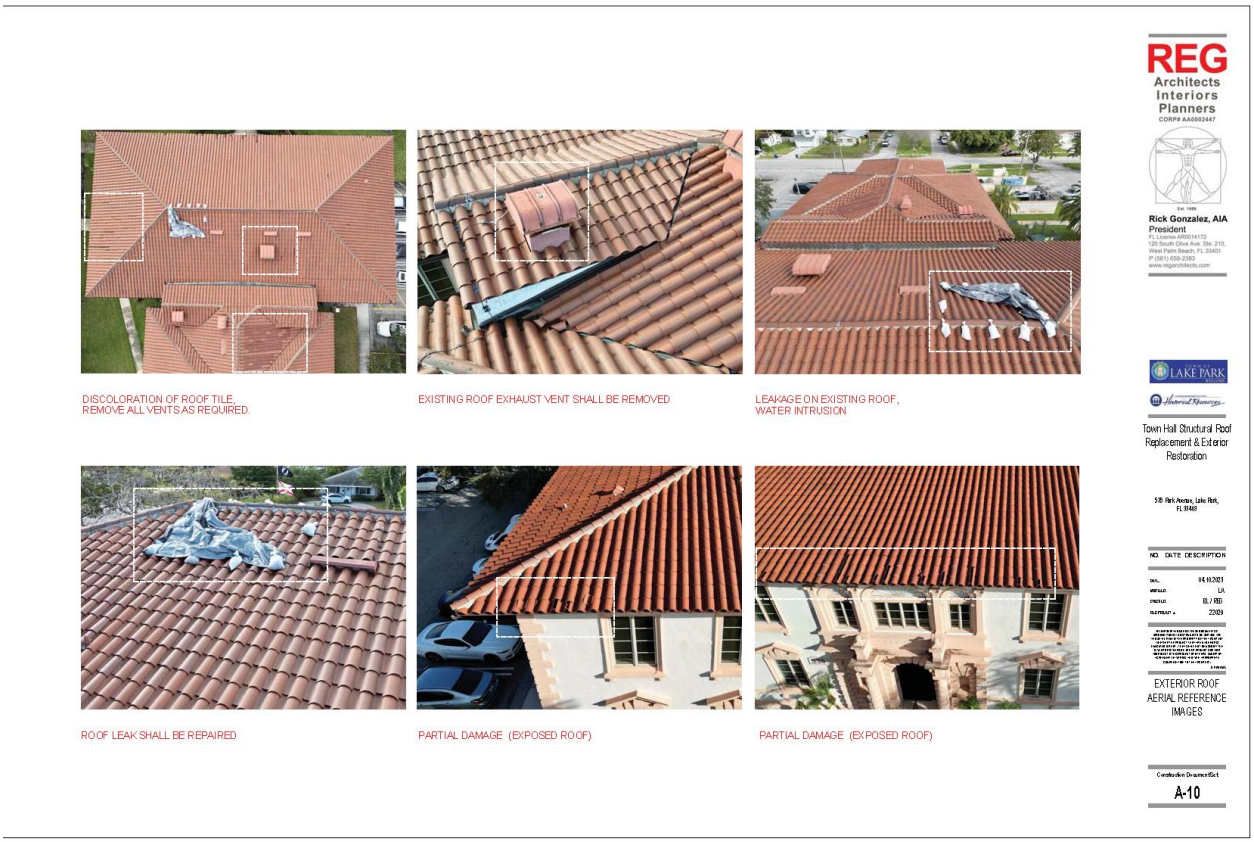
NO. DATE DESCRIPTION

EXTERIOR ROOF AERIAL REFERENCE IMAGES

A-9

Staff Report

EXHIBIT F – Existing Conditions



Staff Report

APPLICABLE GUIDELINES:

Town Code Section 66-10(a) states that an application for a certificate of appropriateness is required to erect, alter, restore, renovate, excavate, move or demolish any structure, building or site that is historically designated.

Town Code Section 66-10(c) states that the Town has adopted the Secretary of Interior's Standards of Rehabilitation, which are guidelines on which applications for any certificate of appropriateness are to be measured and evaluated.

Town Code Section 66-10(e) states that any alteration to buildings or sites other than ordinary maintenance must apply for a Special Certificate of Appropriateness.

ANALYSIS AND STAFF DETERMINATION

This project proposal is being brought forward by the Town's historical architectural consultant, REG, who was retained by the Public Works Department to draft the renovation plans. In their cover letter, REG has confirmed that the proposed renovations are in keeping with the Secretary of the Interior's Standards of Rehabilitation, which are stated under Sec 66-10 (c) to be the adopted standards by which certificate of appropriateness applications are to be reviewed. Pertaining to the 8 criteria, they offered the following responses:

Staff Report

Standards for Preservation

1. A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.

   The proposed restoration and preservation work will not impact the current use to the property. The proposed restoration projects of, roof replacement, balcony concrete restoration, building waterproofing and painting will provide protection and long-term preservation of the building and its structural components.

2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.

   The character of this historic property will not change. New materials introduced as part of the restoration work will be for replacement of existing deteriorated materials or restoration of compromised structural components. These restoration improvement projects are to ensure the long-term preservation of the structure and to provide a safe and operational facility for public and private use.

3. Each property will be recognized as a physical record of its time, place and use. Work needed to stabilize, consolidate and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection and properly documented for future research.

   Materials used in the restoration project will be in like kind of current availability in order to maintain the over historical integrity and design of the existing building.

4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.

   Restoration work will look to minimize the introduction of any changes to the property that might impact the historical significance of this building.

5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.

   The proposed restoration work will maintain the distinctive features and finishes of the existing building.

6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color and texture.

   A condition assessment will be performed to identify the level of deterioration and the actions for repair and or restoration.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

   This project is a building re-roof, balcony concrete restoration and waterproofing & painting; no destructive chemicals or adverse physical treatments will be used.

8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

   Steps will be taken to protect and preserve Archeological resources if encountered.

Staff Report

Based on these responses, staff is satisfied that REG has complied with the requirements of our historic preservation ordinance pertaining to special certificates of appropriateness; for the full proposal details, please refer to REG's plans.

Staff concludes the requested actions are consistent with the Land Development Code and the Secretary of the Interior's Standards and recommends **APPROVAL**.

Public Works
Department

650 Old Dixie Highway
Lake Park, FL 33403
Phone: (561) 881-3345
Fax: (561) 881-3349

www.lakeparkflorida.gov

June 5, 2023

Nadia DiTommaso
Community Development Director
Town of Lake Park
535 Park Avenue
Lake Park, Florida 33403

RE: Town of Lake Park – Historic Town Hall Building
Town Hall Preservation Work
Including Balcony Restoration / Roof Replacement / Painting

Application for a Certificate of Appropriateness

Dear Ms. DiTommaso,

Please accept this letter and the attached supporting documentation as a formal application for a Certificate of Appropriateness from the Town of Lake Park Historical Society Board for the Town Hall building preservation projects summarized below.

The proposed grant-funded projects are necessary to maintain the operational integrity and overall longevity of the building and include: 1. Repair of the existing exterior balconies and 2. Replacement of the existing roof and waterproof & painting of the building exterior.

1. **Exterior Balcony Restoration**

   Attached for your review are engineering plans for the balcony restoration work as prepared by Florida Consulting Engineers, Inc. and architectural plans for the building replacement and painting work as prepared by REG Architects.

   The building exterior balconies have deteriorated to such an extent that they had to be closed as a safety precaution and this measure also prevents the use of the outdoor stairways attached to the balconies during emergencies egress. Accordingly, restoration of these structural components is critical to the safe operation of the building.

2. **Roof Replacement an Building Waterproofing and Painting**

   For the roof replacement work, the Town will utilize methods and means compliant with Historic Preservation construction guidelines set forth in the Secretary of Interior Standards for Rehabilitation. Additionally, a color pallet has been developed by the architect that is in keeping with the historic character and architectural integrity of the building. Public Works staff has also identified a restoration craftsman in the industry and is prepared to move forward with the restoration and preservation work.

Public Works
Department

650 Old Dixie Highway
Lake Park, FL 33403
Phone: (561) 881-3345
Fax: (561) 881-3349

www.lakeparkflorida.gov

In summary, the planned preservation work is required for the safety, preservation, aesthetic benefits, and operational integrity of the existing Town Hall building. With the consent of the Board, Public Works staff will work diligently to implement the proposed improvements, consistent with historic building rehabilitation standards.

Respectfully,

ROBERTO F. TRAVIESO, MPA
Public Work Director

Attachments (7)

APPLICATION FOR A CERTIFICATE OF APPROPRIATENESS
$200 application fee plus escrow deposit (minimum $1,500 at submittal)

I. PROPERTY INFORMATION:

Site Designation Name: Town Hall
Property Address: 535 Park Avenue Lake Park, Fla.
Folio No.: 36-43-42-20-01-019-090

LEGAL DESCRIPTION
Subdivision: Kelsey City
Lot: In PB 6 Page 15 to 18 23, 27 & 34 to 37 Inc
Block: R (Less E 130 FT)

THIS SECTION FOR OFFICE USE ONLY

SPECIAL ☐ REGULAR ☐
Designation No.: _____
Date Application Received: _____
Date of Designation: _____
Type of Designation: _____
Assigned COA No.: _____
Property is in a District: ☐ YES ☐ NO

Non-Contributing: ☐
Contributing: ☐

II. APPLICANT INFORMATION:

Name(s) of Owner: Town of Lake Park
Name of Applicant: Public Works Department
Address of Applicant: 640 Old Dixie Highway Lake Park, Florida 33403
Applicant telephone number: 561-881-3345
Applicant E-Mail Address: publicworks@lakeparkflorida.gov

Applicant is:
☑ Owner
☐ Lease
☐ Contractor
☐ Legal Agent

All applications shall include one or two 3" x 5" color photographs of the designated property and project plans.

III. THE PROPOSED PROJECT WILL INCLUDE:

Please check those that apply to your project.

☐ Maintenance or Repair

☑ Restoration

☐ Rehabilitation

☐ Evacuation

☐ Demolition

☐ New Construction

☐ Relocation

IV. DESCRIPTION OF THE PROPOSED PROJECT:

Please describe what changes will be made to the following items and how they will be accomplished.

Structural System: THIS PHASE OF THE PROJECT WILL INCLUDE CONCRETE RESTORATION OF EXISTING BALCONY SLABS. WORK CONSISTS OF REMOVAL AND REPLACEMENT OF DETERIORATED AREAS.

Roofs and Roofing System: THIS PHASE OF THE PROJECT INCLUDES REMOVAL OF EXISTING ROOFING FOLLOWED BY NEW ROOF-DRY-IN, FLASHING + VENTS, NEW ROOF TILES AND REPAIR OF GUTTERS + DOWNSPOUTS.

Windows and Doors: ——— N/A

Materials: (masonry, wood, metal): ——— N/A

Porches, Porte-cochere, Steps and Stairways: ——— N/A

Painting and Finishes and Color: THIS PHASE OF THE WORK INCLUDES PRESSURE-CLEANING OF EXISTING BUILDING STRUCTURE, PATCHING OF DAMAGED AREAS, PAINTING OF EXTERIOR BUILDING + TRIM AND FINAL CAULKING.

Additions: ——— N/A

Demolitions: ——— N/A

PLEASE DO NOT DETACH FROM APPLICATION.

SIGNATURE REQUIRED BELOW.

Please be advised that Section 51-6 of the *Town of Lake Park Code of Ordinances* provides for the Town to be reimbursed, in addition to any application or administrative fees, for any supplementary fees and costs the Town incurs in processing development review requests.

These costs may include, but are not limited to, advertising and public notice costs, legal fees, consultant fees, additional Staff time, cost of reports and studies, NPDES stormwater review and inspection costs, and any additional costs associated with the building permit and the development review process.

For further information and questions, please contact the Community Development Department at 561-881-3318.

I, _____, have read and understand the regulations above regarding cost recovery.

_____ _____

Property Owner Signature Date

REVISED: 10/29/2013, previous versions obsolete

ADD ADDITIONAL TEXT (IF NEEDED):

THIS PAGE FOR OFFICE USE ONLY

REGULAR CERTIFICATE OF APPROPRIATENESS

Designation Name: _____ **C.O.A. #:** _____

Historic Preservation Specialist Reviewer: _____

Application was received complete: ☐ **Yes** ☐ **No**

Request for Additional Documentation: ☐ **Yes** ☐ **No**

What documents or information requested: _____

Additional Documentation Received: ☐ **Yes** ☐ **No** **Date Received:** _____

Site Inspection: ☐ **Yes** ☐ **No** **Date Inspected:** _____ **Inspector:** _____

☐ **Approved** ☐ **Approved with Conditions** ☐ **Denied**

Expiration Date: _____

_____ _____

(Signed) Historic Preservation Division Director **Date**

NOTE: The Certificate of appropriateness is valid for a period of 180 days after the date of its approval. After the expiration date a 60-day period may be allowed to complete work In progress if the owner can show cause why the work has not been completed; otherwise, the owner must reapply. Any questions regarding this application may be directed to Community Development Director at 561-881-3319.

THIS PAGE FOR OFFICE USE ONLY

SPECIAL CERTIFICATE OF APPROPRIATENESS

Designation Name: _____ **C.O.A. #:** _____

Historic Preservation Specialist Reviewer: _____

Application was received complete: ☐ **Yes** ☐ **No**

Request for Additional Documentation: ☐ **Yes** ☐ **No**

What documents or information requested: _____

Additional Documentation Received: ☐ **Yes** ☐ **No** **Date Received:** _____

Site Inspection: ☐ **Yes** ☐ **No** **Date Inspected:** _____ **Inspector:** _____

STAFF RECCOMENDATIONS:

Date of Board Hearing: _____

Board Actions/Conditions:

☐ **Approved** ☐ **Approved with Conditions** ☐ **Denied**

Expiration Date: _____

_____ _____

(Signed) Historic Preservation Division Director **Date**

NOTE: The Certificate of Appropriateness is valid for a period of 180 days after the date of its approval. After the expiration date a 60-day grace period may be allowed to complete work in progress if the owner can show cause why the work has not been completed; otherwise the owner must reapply.

Exhibit 2 pg 1 of 2

Page 1

☐ Original
☒ Update

HISTORICAL STRUCTURE FORM
FLORIDA MASTER SITE FILE
Version 4.0 1/07

Site #8 PB00198
Field Date 8-30-2016
Form Date 7-21-1981
Recorder #

Shaded Fields represent the minimum acceptable level of documentation.
Consult the *Guide to Historical Structure Forms* for detailed instructions.

MAR 20 2017

Site Name(s) (address if none) Lake Park Town Hall — Multiple Listing (DHR only)
Survey Project Name formerly: Kelsey City City Hall — Survey # (DHR only)
National Register Category (please check one) ☒building ☐structure ☐district ☐site ☐object
Ownership: ☐private-profit ☐private-nonprofit ☐private-individual ☐private-nonspecific ☒city ☐county ☐state ☐federal ☐Native American ☐foreign ☐unknown

LOCATION & MAPPING

	Street Number	Direction	Street Name	Street Type	Suffix Direction
Address:	535		Park	Avenue	

Cross Streets (nearest / between) Sixth Street
USGS 7.5 Map Name RIVIERA BEACH — USGS Date — Plat or Other Map
City / Town (within 3 miles) Lake Park — In City Limits? ☒yes ☐no ☐unknown — County Palm Beach
Township 42S — Range 43E — Section 21 — ¼ section: ☐NW ☐SW ☒SE ☐NE — Irregular-name:
Tax Parcel # 36434220010190010 — Landgrant
Subdivision Name Kelsey City — Block 19 — Lot
UTM Coordinates: Zone ☐16 ☒17 — Easting 5 9 2 3 0 0 — Northing 2 9 6 4 3 6 0
Other Coordinates: X: — Y: — Coordinate System & Datum
Name of Public Tract (e.g., park)

HISTORY

Construction Year: 1927 ☐approximately ☐year listed or earlier ☒year listed or later
Original Use Municipal building — From (year): 1927 — To (year): 2016
Current Use Municipal building — From (year): — To (year):
Other Use — From (year): — To (year):
Moves: ☐yes ☒no ☐unknown Date: — Original address
Alterations: ☐yes ☐no ☒unknown Date: — Nature Fire & Police fac's converted-offices
Additions: ☐yes ☒no ☐unknown Date: — Nature
Architect (last name first): Kitchell, Bruce — Builder (last name first): Arnold Construction Company
Ownership History (especially original owner, dates, profession, etc.) Town of Lake Park

Is the Resource Affected by a Local Preservation Ordinance? ☒yes ☐no ☐unknown Describe

DESCRIPTION

Style Mediterranean Revival — Exterior Plan T-shaped — Number of Stories 2
Exterior Fabric(s) 1. Stucco 2. Concrete-poured 3.
Roof Type(s) 1. Hip 2. 3.
Roof Material(s) 1. Barrel tile 2. 3.
Roof secondary strucs. (dormers etc.) 1. Pavilion tower 2.
Windows (types, materials, etc.) Wood frame with impact glazing

Distinguishing Architectural Features (exterior or interior ornaments) Rusticated frontispiece in the center bay of the seven-bay facade. jack arches and open-bed pediments over the grnd. floor windows

Ancillary Features / Outbuildings (record outbuildings, major landscape features; use continuation sheet if needed.)

DHR USE ONLY	OFFICIAL EVALUATION	DHR USE ONLY
NR List Date ☐Owner Objection	SHPO – Appears to meet criteria for NR listing: ☐yes ☐no ☐insufficient info Date Init. KEEPER – Determined eligible: ☐yes ☐no Date NR Criteria for Evaluation: ☐a ☐b ☐c ☐d (see *National Register Bulletin 15*, p. 2)	

HISTORICAL STRUCTURE FORM

Site # 8 PB00198

DESCRIPTION (continued)

Chimney: No.____ Chimney Material(s): 1. _____ 2. _____
Structural System(s): 1. Brick 2. Structural clay tile 3. _____
Foundation Type(s): 1. Piers 2. Slab
Foundation Material(s): 1. Poured Concrete Footing 2. _____
Main Entrance (stylistic details) Arched entranceway flanked by two engaged columns, flanked by pilasters separated by shallow niches. Unified by bands.
Porch Descriptions (types, locations, roof types, etc.) _____

Condition (overall resource condition): ☐excellent ☒good ☐fair ☐deteriorated ☐ruinous
Narrative Description of Resource _____

Archaeological Remains _____ ☐Check if Archaeological Form Completed

RESEARCH METHODS (check all that apply)

☒FMSF record search (sites/surveys)	☐library research	☐building permits	☐Sanborn maps
☐FL State Archives/photo collection	☐city directory	☐occupant/owner interview	☐plat maps
☒property appraiser / tax records	☐newspaper files	☐neighbor interview	☐Public Lands Survey (DEP)
☐cultural resource survey (CRAS)	☒historic photos	☐interior inspection	☐HABS/HAER record search

☐other methods (describe) _____
Bibliographic References (give FMSF manuscript # if relevant, use continuation sheet if needed) _____

OPINION OF RESOURCE SIGNIFICANCE

Appears to meet the criteria for National Register listing individually? ☒yes ☐no ☐insufficient information
Appears to meet the criteria for National Register listing as part of a district? ☐yes ☐no ☒insufficient information
Explanation of Evaluation (**required**, whether significant or not; use separate sheet if needed) _____

Area(s) of Historical Significance (see *National Register Bulletin 15*, p. 8 for categories: e.g. "architecture", "ethnic heritage", "community planning & development", etc.)
1. Local 3. _____ 5. _____
2. _____ 4. _____ 6. _____

DOCUMENTATION

Accessible Documentation Not Filed with the Site File - including field notes, analysis notes, photos, plans and other important documents
1) Document type All materials at one location Maintaining organization Florida Division of Historical Resources
Document description Nat.Register Hist Places,Inventory Nomin File or accession #'s 8PB198
2) Document type _____ Maintaining organization _____
Document description _____ File or accession #'s _____

RECORDER INFORMATION

Recorder Name W. Carl Shriver Affiliation Florida Division of Archives, History & Records
Recorder Contact Information The Capital, Tallahassee, FL; 904-487-2333
(address / phone / fax / e-mail)

Required Attachments

❶ USGS 7.5' MAP WITH STRUCTURE LOCATION PINPOINTED IN RED
❷ LARGE SCALE STREET, PLAT OR PARCEL MAP (available from most property appraiser web sites)
❸ PHOTO OF MAIN FACADE, ARCHIVAL B&W PRINT OR DIGITAL IMAGE FILE
If submitting an image file, it must be included on disk or CD AND in hard copy format (plain paper is acceptable).
Digital image must be at least 1600 x 1200 pixels, 24-bit color, jpeg or tiff.

AGREEMENT BETWEEN
THE STATE OF FLORIDA, DEPARTMENT OF STATE
AND
Town of Lake Park
23.h.sc.100.018

This Agreement is by and between the State of Florida, Department of State, Division of Historical Resources hereinafter referred to as the "Division," and the Town of Lake Park hereinafter referred to as the "Grantee."

The Grantee has been awarded a Special Category Grant by the Division, grant number 23.h.sc.100.018 for the Project "Lake Park Historic Town Hall Preservation," in the amount of $325,000 ("Grant Award Amount"). The Division enters into this Agreement pursuant to Line Item , contained in the 2023 General Appropriations Act, SB 2500, Laws of Florida. The Division has the authority to administer this grant in accordance with Section 267.0617, *Florida Statutes.*

In consideration of the mutual covenants and promises contained herein, the parties agree as follows:

1. **Grant Purpose.** This grant shall be used exclusively for the "Lake Park Historic Town Hall Preservation," the public purpose for which these funds were appropriated.

   a) The Grantee shall perform the following **Scope of Work**:

      Grant funds will be used to facilitate the repair and preservation of the historic Lake Park Town Hall in Lake Park, Palm Beach County, Florida. Work items include roof replacement, exterior painting, exterior cleaning by the gentlest means possible, remove failing sealant and replace with new sealant on all windows and other openings including joints, and restore exterior masonry, wood, and metal surfaces. Grant funds will also be used for architectural / engineering services and grant project management and administration.

      All tasks associated with the Project shall meet the requirements set forth in this agreement.

   b) The Grantee agrees to provide the following **Deliverables** and **Performance Measures** related to the Scope of Work for payments to be awarded.

#	Payment Type	Deliverable Description	Documentation	Payment Amount
1	Fixed Price	Provide a copy of the professional architectural/engineering consultant's credentials and a project timeline to the Division for review and approval.	One (1) digital copy of professional architectural/engineering consultant credentials; One (1) project timeline.	$81,250

2	Fixed Price	Complete and submit a completed Application and Certificate for Payment (AIA Document G702) and Schedule of Contract Values (AIA Document G703), or their equivalents, showing at least thirty percent (30%) of the project completed to the Division for review and approval.	One (1) electronic copy of a completed Application and Certificate for Payment (AIA Document G702) and Schedule of Contract Values (AIA Document G703), or their equivalents, showing at least thirty percent (30%) of the project completed.	$81,250
3	Fixed Price	Complete and submit a completed Application and Certificate for Payment (AIA Document G702) and Schedule of Contract Values (AIA Document G703), or their equivalents, showing at least sixty percent (60%) of the project completed to the Division for review and approval.	One (1) electronic copy of a completed Application and Certificate for Payment (AIA Document G702) and Schedule of Contract Values (AIA Document G703), or their equivalents, showing at least sixty percent (60%) of the project completed.	$81,250
4	Advanced Payment	Complete and submit an Application and Certificate for Payment (AIA Document G702) and Schedule of Contract Values (AIA Document G703), or their equivalents, showing at least one hundred percent (100%) of the project completed, including all retainage amounts paid, to the Division for review and approval. In addition, a new/updated FMSF form for the property and executed Restrictive Covenants filed with the County Clerk shall be submitted prior to final payment. Furthermore, a Single Audit Form shall be completed by the Grantee and submitted along with the Final Progress Report prior to final payment.	One (1) copy of the completed Application and Certificate for Payment (AIA Document G702) and Schedule of Contract Values (AIA Document G703), or their equivalents, showing at least one hundred percent (100%) of the project completed, including all retainage amounts paid; One (1) copy of the new/updated FMSF form; One (1) copy of the executed Restrictive Covenants filed with the County Clerk; One (1) Single Audit Form.	$81,250
Totals				**$325,000**

c) The Grantee has provided an Estimated Project Budget based upon reasonable expenditures projected to accomplish the Grantee's Scope of Work and Deliverables outlined in the Agreement. The Budget provides details of how grant and match funds will be spent. All expenditures shall be in accordance with this budget (which is incorporated as part of this Agreement and entitled Attachment A) and must be incurred during the term of this Agreement, as stated in Section 2 of this Agreement.

2. **Length of Agreement.** This Agreement shall begin on 07/01/22 and shall end 06/30/24, unless terminated in accordance with the provisions of Section 33 of this Agreement. Contract extensions will not be granted unless

Grantee is able to provide substantial written justification and the Division approves such extension. The Grantee's written request for such extension must be submitted to the Division no later than thirty (30) days prior to the termination date of this Agreement and no amendment will be valid until a written amendment is signed by both parties as required in Section 7 and Section 15 of this Agreement.

3. **Contract Administration.** The parties are legally bound by the requirements of this Agreement. Each party's contract manager, named below, will be responsible for monitoring its performance under this Agreement, and will be the official contact for each party. Any notice(s) or other communications in regard to this agreement shall be directed to or delivered to the other party's contract manager by utilizing the information below. Any change in the contact information below shall be submitted in writing to the contract manager within 10 days of the change.

For the Division of Historical Resources:
Harley Burgis
Florida Department of State
R.A. Gray Building
500 South Bronough Street
Tallahassee, FL 32399
Phone: 850.245.6393
Email: harley.burgis@dos.myflorida.com

For the Grantee:
Contact: Merrell Angstreich
Address: 535 Park Avenue Lake Park Florida 33403
Phone: 561.882.1819
Email:mangstreich@lakeparkflorida.gov

4. **Grant Payments.** All grant payments are requested online via www.dosgrants.com by submitting a payment request with documentation that the deliverable has been completed. The total grant award shall not exceed the Grant Award Amount, which shall be paid by the Division in consideration for the Grantee's minimum performance as set forth by the terms and conditions of this Agreement. Grant payment requests are not considered complete for purposes of payment until review of the deliverables for compliance with the terms and conditions of this Agreement by the appropriate Division staff is complete and approval of the deliverable given. The grant payment schedule is outlined below:

   a) All payments will be made in the amounts identified with the Deliverables in Section 1 of this agreement

   b) All payments will be made in accordance with the completion of those Deliverables.

5. **Electronic Payments.** The Grantee can choose to use electronic funds transfer (EFT) to receive grant payments. All grantees wishing to receive their award through electronic funds transfer must submit a Direct Deposit Authorization form to the Florida Department of Financial Services. If EFT has already been set up for the organization, the Grantee does not need to submit another authorization form unless the organization has changed bank accounts. The authorization form is accessible at http://www.myfloridacfo.com/Division/AA/Forms/DFS-A1-26E.pdf where information pertaining to payment status is also available.

6. **Florida Substitute Form W-9.** A completed Substitute Form W-9 is required from any entity that receives a payment from the State of Florida that may be subject to 1099 reporting. The Department of Financial Services

(DFS) must have the correct Taxpayer Identification Number (TIN) and other related information in order to report accurate tax information to the Internal Revenue Service (IRS). To register or access a Florida Substitute Form W-9 visit https://flvendor.myfloridacfo.com/. **A copy of the Grantee's Florida Substitute Form W-9 must be submitted to the Division, as required, in advance of or with the executed Agreement.**

7. **Amendment to Agreement.** Either party may request modification of the provisions of this Agreement by contacting the Division to request an Amendment to the Contract. **Changes which are agreed upon shall be valid only when in writing, signed by each of the parties, and attached to the original of this Agreement.** If changes are implemented without the Division's written approval, the organization is subject to noncompliance, and the grant award is subject to reduction, partial, or complete refund to the State of Florida and termination of this agreement.

8. **Financial Consequences.** The Department shall apply the following financial consequences for failure to perform the minimum level of services required by this Agreement in accordance with Sections 215.971 and 287.058, *Florida Statutes*.

   a) Any advanced funds will be returned to the State of Florida if unexpended within the first 3 months of disbursement.

   b) Payments will be withheld for failure to complete services as identified in the Scope of Work and Deliverables, provide documentation that the deliverable has been completed, or demonstrate the appropriate use of state funds.

   c) If the grantee has spent less than the Grant Award Amount in state funds to complete the Scope of Work, the final payment will be reduced by an amount equal to the difference between spent state dollars and the Grant Award Amount.

   d) The Division may reduce individual payments by 10% if the completed Deliverable does not meet the Secretary of the Interior's Standards and Guidelines or other industry standards applicable to the project.

   The Division shall reduce total grant funding for the Project in direct proportion to match contributions not met by the end of the grant period. This reduction shall be calculated by dividing the actual match amount by the required match amount indicated in the Agreement and multiplying the product by the Grant Award Amount indicated in the Agreement. Pursuant to Section 17, Grantee shall refund to the Division any excess funds paid out prior to a reduction of total grant funding.

9. **Additional Special Conditions.**

   Development Projects

   a) All project work must be in compliance with the ***Secretary of the Interior's Standards and Guidelines*** available online at www.nps.gov/tps/standards.htm.

   b) The Grantee shall provide photographic documentation of the restoration activity. Guidelines regarding the photographic documentation are available online at https://dos.myflorida.com/historical/grants/special-category-grants/.

   c) The Grantee and the Property Owner(s), if not the same, shall execute and file Restrictive Covenants with

the Clerk of the Circuit Court in the county where the property is located, prior to final release of grant funds and close-out of the project. This Restrictive Covenants form is available on the Division's website http://www.dos.myflorida.com/historical/grants/special-category-grants/.

d) Architectural Services

1. All projects shall require contracting for architectural/engineering services.

2. The Grantee may request a waiver of this requirement from the Division if they believe that the architectural/engineering services are not needed for the Project. The Division shall make a recommendation to the Grantee after review of the proposed work.

e) Architectural Documents and Construction Contracts

The Grantee shall submit the architectural services contract to the Department for review and approval prior to final execution. In addition, pursuant to *Section 267.031(5)(i), Florida Statutes*, the Grantee shall submit architectural planning documents to the Department for review and approval at the following stages of development:

1. Upon completion of **schematic design**;

2. Upon completion of **design development and outline specifications**; and

3. Upon completion of **100% construction documents and project manual**, prior to execution of the construction contract.

f) For the construction phase of the Project, in addition to the review submissions indicated above, a copy of the construction contract must be submitted to the Department for review and approval prior to final execution. Department review and approval of said contracts shall not be construed as acceptance by or imposition upon the Department of any financial liability in connection with said contracts.

g) For projects involving ground disturbance (examples include: historic building or structure relocation, grading and site work, installation of sewer and water lines, subgrade foundation repairs or damp proofing, construction of new foundations and installation of landscape materials), the Grantee shall ensure that the following requirements are included in all contracts for architectural and engineering services:

1. Ground disturbance around historic buildings or elsewhere on the site shall be minimized, thus reducing the possibility of damage to or destruction of significant archaeological resources.

2. If an archaeological investigation of the Project site has not been completed, the architect or engineer shall contact the Department for assistance in determining the actions necessary to evaluate the potential for adverse effects of the ground disturbing activities on significant archaeological resources.

3. Significant archaeological resources shall be protected and preserved in place whenever possible. Heavy machinery shall not be allowed in areas where significant archaeological resources may be disturbed or damaged.

4. When preservation of significant archaeological resources in place is not feasible, a mitigation plan shall be developed in consultation with and approved by the Department's Compliance Review Section (contact information available online at www.flheritage.com). The mitigation plan shall be

implemented under the direction of an archaeologist meeting the *Secretary of the Interiors' Professional Qualification Standards for Archaeology*.

5. Documentation of archaeological investigation and required mitigation actions shall be submitted to the Compliance Review Section for review and approval. This documentation shall conform to the *Secretary of the Interior's Standards for Archaeological Documentation*, and the reporting standards of the Compliance Review Section set forth in Chapter 1A-46, *Florida Administrative Code*.

h) Copyright and Royalties: When publications, brochures, films, or similar materials are developed, directly or indirectly, from a program, project or activity supported by grant funds, any copyright resulting therefrom shall be held by the Florida Department of State, Division of Historical Resources. The author may arrange for copyright of such materials only after approval from the Department. Any copyright arranged for by the author shall include acknowledgment of grant assistance. As a condition of grant assistance, the grantee agrees to, and awards to the Department and, if applicable, to the Federal Government, and to its officers, agents, and employees acting within their official duties, a royalty-free, nonexclusive, and irrevocable license throughout the world for official purposes, to publish, translate, reproduce, and use all subject data or copyrightable material based on such data covered by the copyright.

10. **Credit Line(s) to Acknowledge Grant Funding.** Pursuant to Section 286.25, *Florida Statutes*, in publicizing, advertising, or describing the sponsorship of the program the Grantee shall include the following statement:

a) "This project is sponsored in part by the Department of State, Division of Historical Resources and the State of Florida." Any variation in this language must receive prior approval in writing by the Division.

b) All site-specific projects must include a Project identification sign, with the aforementioned language, that must be placed on site. The cost of preparation and erection of the Project identification sign are allowable project costs. Routine maintenance costs of Project signs are not allowable project costs. A photograph of the aforementioned sign must be submitted to the Division as soon as it is erected.

11. **Encumbrance of Funds.** The Grantee shall execute a binding contract for at least a part of the Scope of Work by September 30, except as allowed below.

a) Extension of Encumbrance Deadline: The encumbrance deadline indicated above may be extended by written approval of the Division. To be eligible for this extension, the Grantee must demonstrate to the Division that encumbrance of grant funding and the required match by binding contract(s) is achievable by the end of the requested extended encumbrance period. The Grantee's written request for extension of the encumbrance deadline must be submitted to the Department no later than fifteen (15) days prior to the encumbrance deadline indicated above.

b) Encumbrance Deadline Exception: For projects not involving contract services the Grantee and the Department shall consult on a case-by-case basis to develop an acceptable encumbrance schedule.

12. **Grant Reporting Requirements.** The Grantee must submit the following reports to the Division. All reports shall document the completion of any deliverables/tasks, expenses and activities that occurred during that reporting period. All reports on grant progress will be submitted online via www.dosgrants.com.

a) **First Project Progress Report** is due by October 31, for the period ending September 30 (first year of the Grant Period).

b) **Second Project Progress Report** is due by January 31, for the period ending December 31 (first year of the Grant Period).

c) **Third Project Progress Report** is due by April 30, for the period ending March 31 (first year of the Grant Period).

d) **Fourth Project Progress Report** is due by July 31, for the period ending June 30 (first year of the Grant Period).

e) **Fifth Project Progress Report** is due by October 31, for the period ending September 30 (second year of the Grant Period).

f) **Sixth Project Progress Report** is due by January 31, for the period ending December 31 (second year of the Grant Period).

g) **Seventh Project Progress Report** is due by April 30, for the period ending March 31 (second year of the Grant Period).

h) **Final Report**. The Grantee must submit a Final Report to the Division within one month of the Grant Period End Date set forth in Section 2 above.

13. Matching Funds. The Grantee is required to provide a 100% match of the Grant Award Amount. Of the required match, a minimum of 25% must be cash on hand. The remaining match may include in-kind services, volunteer labor, donated materials, and additional cash. For projects located in Rural Economic Development Initiative (REDI) counties or communities that have been designated in accordance with Sections 288.0656 and 288.06561, *Florida Statutes*, Grantees may request a reduction of the match amount. The Grantee must submit documentation that the minimum match requirements have been met and provide to the Division documentation evidencing expenses incurred to comply with this requirement.

14. Grant Completion Deadline. The grant completion deadline is the end date of this Agreement set forth in Section 2 above. The Grant Completion Deadline is the date when all grant and matching funds have been paid out or incurred in accordance with the work described in the Scope of Work, detailed in the Estimated Project Budget. If the Grantee finds it necessary to request an extension of the Grant Completion Deadline, an Amendment to the Agreement must be executed as per Section 7, and the stipulations in Section 15 must be met.

15. Extension of the Grant Completion Deadline. An extension of the completion date must be requested at least thirty (30) days prior to the end of the Grant Period and may not exceed 180 days, unless the Grantee can clearly demonstrate extenuating circumstances. An extenuating circumstance is one that is beyond the control of the Grantee, and one that prevents timely completion of the Project such as a natural disaster, death or serious illness of the individual responsible for the completion of the Project, litigation related to the Project, or failure of the contractor or architect to provide the services for which they were contracted to provide. An extenuating circumstance does not include failure to read or understand the administrative requirements of a grant or failure to raise sufficient matching funds. Changes to the original completion deadline shall be valid only when requested in writing, approved by the Division, and an Amendment to the Agreement has been executed by both parties and attached to the original of this Agreement. The Grantee must provide documentation that a portion of the grant funds and match contributions are encumbered and demonstrate to the satisfaction of the Division that project work is progressing at a rate such that completion is achievable within the extended Grant Period.

16. **Non-allowable Grant Expenditures.** The Grantee agrees to expend all grant funds received under this agreement solely for the purposes for which they were authorized and appropriated. Expenditures shall be in compliance with the state guidelines for allowable Project costs as outlined in the Department of Financial Services' Reference Guide for State Expenditures (revised 11/1/2019), which are incorporated by reference and are available online at https://www.myfloridacfo.com/Division/AA/Manuals/documents/ReferenceGuideforStateExpenditures.pdf. The following categories of expenditures are non-allowable for expenditure of grant funds and as contributions to required match:

a) Expenditures for work not included in the Scope of Work of the executed Grant Award Agreement;

b) Costs of goods and services not procured in accordance with procurement procedures set forth in the Grant Award Agreement and Chapter 287 of the *Florida Statutes*;

c) Expenses incurred or obligated prior to or after the Grant Period, as indicated in the Grant Award Agreement;

d) Expenses associated with lobbying or attempting to influence Federal, State, or local legislation, the judicial branch, or any state agency;

e) Expenditures for work not consistent with the applicable historic preservation standards as outlined in the Secretary of the Interior's Guidelines available at www.nps.gov/tps/standards/treatment-guidelines-2017.pdf, standards available at http://www.nps.gov/tps/standards.htm and nps.gov/history/local-law/arch_stnds_0.htm or applicable industry standards;

f) Costs for projects having as their primary purpose the fulfillment of Federal or State historic preservation regulatory requirements, specifically, costs of consultation and mitigation measures required under Section 106 of the *National Historic Preservation Act of 1966*, as amended, or under Section 267.031, F.S.;

g) Projects directed at activities or Historic Properties that are restricted to private or exclusive participation or access, which shall include restricting access on the basis of sex, race, color, religion, national origin, disability, age, pregnancy, handicap, or marital status;

h) Entertainment, food, beverages, plaques, awards, or gifts;

i) Costs or value of donations or In-kind Contributions not documented in accordance with the provisions of the Grant Award Agreement;

j) Indirect costs including Grantee overhead, management expenses, general operating costs and other costs that are not readily identifiable as expenditures for the materials and services required to complete the work identified in the Scope of Work in the Grant Award Agreement. Examples of indirect costs include: rent/mortgage, utilities, janitorial services, insurance, accounting, internet service, monthly expenses associated to security systems, non-grant related administrative and clerical staffing, marketing, and fundraising activities;

k) Administrative and project management expenditures such as expenditures that are directly attributable to management of the grant-assisted Project and meeting the reporting and associated requirements of the Grant Award Agreement, whether grant expenditures or match contributions, which in aggregate exceed 5% of the grant award amount;

l) Grantee operational support (i.e., organization salaries not directly related to grant activities; travel expenditures; per diem; or supplies);

m) Insurance costs (Exception: costs for builder's risk, workers' compensation and contractor's liability insurance);

n) Capital improvements to non-historic properties or non-historic additions to a Historic Property (Exception: pre-approved items of work for Museum Exhibit projects);

o) Capital improvements to the interior of Religious Properties (Exception: repairs to elements of the structural system. Examples include: foundation repairs, repairs to columns, load bearing wall framing, roof framing, masonry repairs, window and exterior door repairs and restoration practices associated with the building envelope);

p) Accessibility improvements for Religious Properties;

q) Vehicular circulation (drives/driveways) within the property or from the property to surrounding streets and parking (Exception: provision of code-required handicapped parking pad(s));

r) Sidewalks, paths, walkways, landscape features and accessories, planting, irrigation systems and site lighting (Exceptions: historic walkways; sidewalk required to link the code-required handicapped parking pad(s) to the accessible entry; historic retaining walls/planting/sodding required to halt documented erosion; pruning, removal or relocation of trees posing an immediate threat to the historic or archaeological resource; and limited site lighting required for security, all if approved by the Division);

s) Fences and gates (Exception: restoration or in-kind replacement of damaged or missing historic fences, gates or sections of these);

t) Furniture, including but not limited to: desks, tables, seating, rugs and mats, artwork and decorations, window treatments, case goods (including cabinets, countertops, or bookshelves) with no historic precedent, systems' furniture, movable partitions and acoustical treatments and components, unless specific prior approval has been granted by the Division (Exception: museum display units necessary for approved Museum Exhibit projects)

u) Equipment (a) including but not limited to portable sound systems, specialty fixtures and equipment, visual display units, appliances, computers, cameras, printers, scanners, projection systems, portable light fixtures, and total stations unless specific prior approval has been granted by the Division (b) If special equipment is required for completion of the Project, it shall be rented for the grant term unless it can be shown that acquiring the equipment is cheaper than renting the equipment and approval has been provided by the Division as part of the documentation presented at the time of application. If the value of special equipment is to be used as a match contribution, the value of the match contribution shall be limited to the cost of rental for the Grant Period at the market rate for such rental in the region;

v) Supplies that will not be consumed in use during the duration of this project;

w) Costs associated with attending or hosting conferences, summits, workshops or presentations (Exception: municipal or county required public meetings necessary for completion of the grant-assisted project);

x) Travel expenditures, including those of personnel responsible for items of work approved by the Division, administrative personnel, contracted or subcontracted employees, either for purposes of work on-site or

research off-site; and

y) Tuition waivers, fees, and other non-grant related costs associated with employing students for grant projects.

17. **Unobligated and Unearned Funds and Allowable Costs.** In accordance with Section 215.971, *Florida Statutes*, the Grantee shall refund to the State of Florida any balance of unobligated funds which has been advanced or paid to the Grantee. In addition, funds paid in excess of the amount to which the recipient is entitled under the terms and conditions of the agreement must be refunded to the state agency. Further, the recipient may expend funds only for allowable costs resulting from obligations incurred during the specified agreement period. Expenditures of state financial assistance must be in compliance with the laws, rules, and regulations applicable to expenditures of State funds, including, but not limited to, the *Reference Guide for State Expenditures.*

18. **Repayment.** All refunds or repayments to be made to the Department under this Agreement are to be made payable to the order of the "Department of State" and mailed directly to the following address: Florida Department of State, Attention: Grants Program Supervisor, Division of Historical Resources, 500 South Bronough Street Tallahassee, FL 32399. In accordance with Section 215.34(2), *Florida Statutes*, if a check or other draft is returned to the Department for collection, Grantee shall pay to the Department a service fee of $15.00 or five percent (5%) of the face amount of the returned check or draft, whichever is greater.

19. **Single Audit Act.** Each Grantee, other than a Grantee that is a State agency, shall submit to an audit pursuant to Section 215.97, *Florida Statutes*. See Attachment B for additional information regarding this requirement.

20. **Retention of Accounting Records.** Financial records, supporting documents, statistical records, and all other records including electronic storage media pertinent to the Project shall be retained for a period of five (5) years after the close out of the grant. If any litigation or audit is initiated, or claim made, before the expiration of the five-year period, the records shall be retained until the litigation, audit, or claim has been resolved.

21. **Obligation to Provide State Access to Grant Records.** The Grantee must make all grant records of expenditures, copies of reports, books, and related documentation available to the Division or a duly authorized representative of the State of Florida for inspection at reasonable times for the purpose of making audits, examinations, excerpts, and transcripts.

22. **Obligation to Provide Public Access to Grant Records.** The Division reserves the right to unilaterally cancel this Agreement in the event that the Grantee refuses public access to all documents or other materials made or received by the Grantee that are subject to the provisions of Chapter 119, *Florida Statutes*, known as the *Florida Public Records Act.* The Grantee must immediately contact the Division's Contract Manager for assistance if it receives a public records request related to this Agreement.

23. **Investment of Funds Received But Not Paid Out.** The Grantee may temporarily invest any or all grant funds received but not expended, in an interest bearing account pursuant to Section 216.181(16)(b), *Florida Statutes*. Interest earned on such investments should be returned to the Division quarterly, except that interest accrued less than $100 within any quarter may be held until the next quarter when the accrued interest totals more than $100. All interest accrued and not paid to the Division, regardless of amount, must be submitted with the Grantee's final Progress Report at the end of the Grant Period.

24. **Noncompliance with Grant Requirements.** Any Grantee that has not submitted required reports or satisfied other administrative requirements for this grant or other Division of Historical Resources grants or grants from any other Florida Department of State (DOS) Division will be in noncompliance status and subject to the DOS Grants Compliance Procedure. Grant compliance issues must be resolved before a grant award agreement may be executed, and before grant payments for any DOS grant may be released.

25. **Accounting Requirements.** The Grantee must maintain an accounting system that provides a complete record of the use of all grant funds as follows:

    a) The accounting system must be able to specifically identify and provide audit trails that trace the receipt, maintenance, and expenditure of state funds;

    b) Accounting records must adequately identify the sources and application of funds for all grant activities and must classify and identify grant funds by using the same budget categories that were approved in the grant application. If Grantee's accounting system accumulates data in a different format than the one in the grant application, subsidiary records must document and reconcile the amounts shown in the Grantee's accounting records to those amounts reported to the Division.

    c) An interest-bearing checking account or accounts in a state or federally chartered institution may be used for revenues and expenses described in the Scope of Work and detailed in the Estimated Project Budget.

    d) The name of the account(s) must include the grant award number;

    e) The Grantee's accounting records must have effective control over and accountability for all funds, property, and other assets; and

    f) Accounting records must be supported by source documentation and be in sufficient detail to allow for a proper pre-audit and post-audit (such as invoices, bills, and canceled checks).

26. **Availability of State Funds.** The State of Florida's performance and obligation to pay under this Agreement are contingent upon an annual appropriation by the Florida Legislature, or the United States Congress in the case of a federally funded grant. In the event that the state or federal funds upon which this Agreement is dependent are withdrawn, this Agreement will be automatically terminated and the Division shall have no further liability to the Grantee, beyond those amounts already released prior to the termination date. Such termination will not affect the responsibility of the Grantee under this Agreement as to those funds previously distributed. In the event of a state revenue shortfall, the total grant may be reduced accordingly.

27. **Independent Contractor Status of Grantee.** The Grantee, if not a state agency, agrees that its officers, agents and employees, in performance of this Agreement, shall act in the capacity of independent contractors and not as officers, agents, or employees of the state. The Grantee is not entitled to accrue any benefits of state employment, including retirement benefits and any other rights or privileges connected with employment by the State of Florida.

28. **Grantee's Subcontractors.** The Grantee shall be responsible for all work performed and all expenses incurred in connection with this Agreement. The Grantee may subcontract, as necessary, to perform the services and to provide commodities required by this Agreement. The Division shall not be liable to any subcontractor(s) for any expenses or liabilities incurred under the Grantee's subcontract(s), and the Grantee shall be solely liable to its subcontractor(s) for all expenses and liabilities incurred under its subcontract(s). The Grantee must take the

necessary steps to ensure that each of its subcontractors will be deemed to be "independent contractors" and will not be considered or permitted to be agents, servants, joint ventures, or partners of the Division.

29. **Liability.** The Division will not assume any liability for the acts, omissions to act, or negligence of, the Grantee, its agents, servants, or employees; nor may the Grantee exclude liability for its own acts, omissions to act, or negligence, to the Division.

   a) The Grantee shall be responsible for claims of any nature, including but not limited to injury, death, and property damage arising out of activities related to this Agreement by the Grantee, its agents, servants, employees, and subcontractors. The Grantee, other than a Grantee which is the State or the State's agencies or subdivisions, as defined in Section 768.28, *Florida Statutes*, shall indemnify and hold the Division harmless from any and all claims of any nature and shall investigate all such claims at its own expense. If the Grantee is governed by Section 768.28, *Florida Statutes*, it shall only be obligated in accordance with that Section.

   b) Neither the state nor any agency or subdivision of the state waives any defense of sovereign immunity, or increases the limits of its liability, by entering into this Agreement.

   c) The Division shall not be liable for attorney fees, interest, late charges or service fees, or cost of collection related to this Agreement.

   d) The Grantee shall be responsible for all work performed and all expenses incurred in connection with the Project. The Grantee may subcontract as necessary to perform the services set forth in this Agreement, including entering into subcontracts with vendors for services and commodities; and provided that it is understood by the Grantee that the Division shall not be liable to the subcontractor for any expenses or liabilities incurred under the subcontract and that the Grantee shall be solely liable to the subcontractor for all expenses and liabilities incurred under the subcontract.

30. **Strict Compliance with Laws.** The Grantee shall perform all acts required by this Agreement in strict conformity with all applicable laws and regulations of the local, state and federal law.

31. **No Discrimination.** The Grantee may not discriminate against any employee employed under this Agreement, or against any applicant for employment because of race, color, religion, gender, national origin, age, pregnancy, handicap or marital status. The Grantee shall insert a similar provision in all of its subcontracts for services under this Agreement.

32. **Breach of Agreement.** The Division will demand the return of grant funds already received, will withhold subsequent payments, and/or will terminate this agreement if the Grantee improperly expends and manages grant funds, fails to prepare, preserve or surrender records required by this Agreement, or otherwise violates this Agreement.

33. **Termination of Agreement.**

   a) Termination by the Division. The Division will terminate or end this Agreement if the Grantee fails to fulfill its obligations herein. In such event, the Division will provide the Grantee a notice of its violation by letter, and shall give the Grantee fifteen (15) calendar days from the date of receipt to cure its violation. If the violation is not cured within the stated period, the Division will terminate this Agreement. The notice of

violation letter shall be delivered to the Grantee's Contract Manager, personally, or mailed to his/her specified address by a method that provides proof of receipt. In the event that the Division terminates this Agreement, the Grantee will be compensated for any work completed in accordance with this Agreement, prior to the notification of termination, if the Division deems this reasonable under the circumstances. Grant funds previously advanced and not expended on work completed in accordance with this Agreement shall be returned to the Division, with interest, within thirty (30) days after termination of this Agreement. The Division does not waive any of its rights to additional damages, if grant funds are returned under this Section.

b) Termination for convenience. The Division or the Grantee may terminate the grant in whole or in part when both parties agree that the continuation of the Project would not produce beneficial results commensurate with the further expenditure of funds. The two parties will agree upon the termination conditions, including the effective date, and in the case of partial terminations, the portion to be terminated.

c) Termination by Grantee. The Grantee may unilaterally cancel the grant at any time prior to the first payment on the grant although the Department must be notified in writing prior to cancellation. After the initial payment, the Project may be terminated, modified, or amended by the Grantee only by mutual agreement of the Grantee and the Division. Request for termination prior to completion must fully detail the reasons for the action and the proposed disposition of the uncompleted work.

34. Preservation of Remedies. No delay or omission to exercise any right, power, or remedy accruing to either party upon breach or violation by either party under this Agreement, shall impair any such right, power or remedy of either party; nor shall such delay or omission be construed as a waiver of any such breach or default, or any similar breach or default.

35. Non-Assignment of Agreement. The Grantee may not assign, sublicense nor otherwise transfer its rights, duties or obligations under this Agreement without the prior written consent of the Division, which consent shall not unreasonably be withheld. The agreement transferee must demonstrate compliance with the requirements of the Project. If the Division approves a transfer of the Grantee's obligations, the Grantee shall remain liable for all work performed and all expenses incurred in connection with this Agreement. In the event the Legislature transfers the rights, duties, and obligations of the Division to another governmental entity pursuant to Section 20.06, *Florida Statutes*, or otherwise, the rights, duties, and obligations under this Agreement shall be transferred to the successor governmental agency as if it was the original party to this Agreement.

36. Required Procurement Procedures for Obtaining Goods and Services. The Grantee shall provide maximum open competition when procuring goods and services related to the grant-assisted project. Procurement documentation supporting maximum open competition must be submitted to the Division for review and approval prior to execution of project contracts.

a) **Procurement of Goods and Services Not Exceeding $35,000.** The Grantee must use the applicable procurement method described below:

1. Purchases Up to $2,500: Procurement of goods and services where individual purchases do not exceed $2,500 may be conducted at the Grantee's discretion using good purchasing practices in accordance with Rule 60A-1.002, *Florida Administrative Code.*
2. Purchases or Contract Amounts Between $2,500 and $35,000: Goods and services costing between $2,500 and $35,000 require informal competition such as written quotations and informal bids and may be procured by purchase order, acceptance of vendor proposals or other appropriate procurement

document in accordance with Rule 60A-1.002, *Florida Administrative Code.*

b) **Procurement of Goods and Services Exceeding $35,000.** Goods and services costing over $35,000 may be procured by either Formal Invitation to Bid, Request for Proposals or Invitation to Negotiate and may be procured by purchase order, acceptance of vendor proposals or other appropriate procurement document in accordance with Chapter 287, *Florida Statutes.*

37. Conflicts of Interest. The Grantee hereby certifies that it is cognizant of the prohibition of conflicts of interest described in Sections 112.311 through 112.326, *Florida Statutes*, and affirms that it will not enter into or maintain a business or other relationship with any employee of the Department of State that would violate those provisions. The Grantee further agrees to seek authorization from the General Counsel for the Department of State prior to entering into any business or other relationship with a Department of State Employee to avoid a potential violation of those statutes.

38. Binding of Successors. This Agreement shall bind the successors, assigns and legal representatives of the Grantee and of any legal entity that succeeds to the obligations of the Division of Historical Resources.

39. No Employment of Unauthorized Aliens. The employment of unauthorized aliens by the Grantee is considered a violation of Section 274A (a) of the Immigration and Nationality Act. If the Grantee knowingly employs unauthorized aliens, such violation shall be cause for unilateral cancellation of this Agreement.

40. Severability. If any term or provision of the Agreement is found to be illegal and unenforceable, the remainder will remain in full force and effect, and such term or provision shall be deemed stricken.

41. Americans with Disabilities Act. All programs and facilities related to tGoverning his Agreement must meet the standards of Sections 553.501-553.513, *Florida Statutes*, and the Americans with Disabilities Act of 1990 as amended (42 U.S.C. 12101, *et seq.*), which is incorporated herein by reference.

42. Governing Law. This Agreement shall be construed, performed, and enforced in all respects in accordance with the laws and rules of Florida. Venue or location for any legal action arising under this Agreement will be in Leon County, Florida.

43. Restrictive Covenants. For Acquisition and Development projects directed at Real Property, if funded, the Grantee (and the Property Owner, if not the Grantee) must file a Restrictive Covenant on the property with the Clerk of Court for ten (10) years for Development and twenty (20) for Acquisition prior to final release of grant funds and close-out of the project.

44. Entire Agreement. The entire Agreement of the parties consists of the following documents:

a) This Agreement

b) Estimated Project Budget (Attachment A)

c) Single Audit Act Requirements and Exhibit I (Attachment B)

In acknowledgment of this grant, provided from funds appropriated in the 2023 General Appropriation Act, I hereby certify that I have read this entire Agreement, and will comply with all of its requirements.

Department of State:

By: Alissa Lotane

~~Dr.~~ Timothy Parsons, Division Director, Alissa Lotane

7/21/22

Date

Grantee:

By: _____

Authorizing Official for the Grantee

Michael O'Rourke, Mayor

Typed name and title

July 20, 2022

Date

ATTACHMENT A

Estimated Project Budget

Description	Grant Funds	Cash Match	In Kind Match
Grant Project Management and Administration	$0	$0	$15,000
Architectural / Engineering Services	$0	$50,000	$0
Roofing	$235,000	$235,000	$0
Painting/Waterproofing	$75,000	$15,000	$0
Restore exterior masonry, wood, and metal surfaces	$15,000	$10,000	$0
Totals	**$325,000**	**$310,000**	**$15,000**

ATTACHMENT B
FLORIDA SINGLE AUDIT ACT REQUIREMENTS

AUDIT REQUIREMENTS

The administration of resources awarded by the Department of State to the Grantee may be subject to audits and/or monitoring by the Department of State as described in this Addendum to the Grant Award Agreement.

MONITORING

In addition to reviews of audits conducted in accordance with 2 CFR 200, Subpart F - Audit Requirements, and section 215.97, Florida Statutes (F.S.), as revised (see AUDITS below), monitoring procedures may include, but not be limited to, on-site visits by Department of State staff, limited scope audits as defined by 2 CFR §200.425, or other procedures. By entering into this agreement, the recipient agrees to comply and cooperate with any monitoring procedures or processes deemed appropriate by the Department of State. In the event the Department of State determines that a limited scope audit of the recipient is appropriate, the recipient agrees to comply with any additional instructions provided by Department of State staff to the recipient regarding such audit. The recipient further agrees to comply and cooperate with any inspections, reviews, investigations, or audits deemed necessary by the Chief Financial Officer (CFO) or Auditor General.

AUDITS

Part I: Federally Funded

This part is applicable if the recipient is a state or local government or a nonprofit organization as defined in 2 CFR §200.90, §200.64, and §200.70.

1. A recipient that expends $750,000 or more in federal awards in its fiscal year must have a single or program-specific audit conducted in accordance with the provisions of 2 CFR 200, Subpart F - Audit Requirements. EXHIBIT 1 to this agreement lists the federal resources awarded through the Department of State by this agreement. In determining the federal awards expended in its fiscal year, the recipient shall consider all sources of federal awards, including federal resources received from the Department of State. The determination of amounts of federal awards expended should be in accordance with the guidelines established in 2 CFR §§200.502-503. An audit of the recipient conducted by the Auditor General in accordance with the provisions of 2 CFR §200.514 will meet the requirements of this Part.

2. For the audit requirements addressed in Part I, paragraph 1, the recipient shall fulfill the requirements relative to auditee responsibilities as provided in 2 CFR §§200.508-512.

3. A recipient that expends less than $750,000 in federal awards in its fiscal year is not required to have an audit conducted in accordance with the provisions of 2 CFR 200, Subpart F - Audit Requirements. If the recipient expends less than $750,000 in federal awards in its fiscal year and elects to have an audit conducted in accordance with the provisions of 2 CFR 200, Subpart F - Audit Requirements, the cost of the audit must be paid from non-federal resources (i.e., the cost of such an audit must be paid from recipient resources obtained from other than federal entities).

The Internet web addresses listed below will assist recipients in locating documents referenced in the text of this agreement and the interpretation of compliance issues.

U.S. Government Printing Office www.ecfr.gov

Part II: State Funded

This part is applicable if the recipient is a nonstate entity as defined by section 215.97(2), F.S.

1. In the event that the recipient expends a total amount of state financial assistance equal to or in excess of $750,000 in any fiscal year of such recipient (for fiscal years ending June 30, 2017, and thereafter), the recipient must have a state single or project-specific audit for such fiscal year in accordance with section 215.97, F.S.; Rule Chapter 69I-5, F.A.C., State Financial Assistance; and Chapters 10.550 (local governmental entities) and 10.650 (nonprofit and for-profit organizations), Rules of the Auditor General. EXHIBIT 1 to this agreement lists the state financial assistance awarded through the Department of State by this agreement. In determining the state financial assistance expended in its fiscal year, the recipient shall consider all sources of state financial assistance, including state financial assistance received from the Department of State, other state agencies, and other nonstate entities. State financial assistance does not include federal direct or pass-through awards and resources received by a nonstate entity for federal program matching requirements.

2. For the audit requirements addressed in Part II, paragraph 1, the recipient shall ensure that the audit complies with the requirements of section 215.97(8), F.S. This includes submission of a financial reporting package as defined by section 215.97(2), F.S., and Chapters 10.550 (local governmental entities) and 10.650 (nonprofit and for-profit organizations), Rules of the Auditor General.

3. If the recipient expends less than $750,000 in state financial assistance in its fiscal year (for fiscal years ending June 30, 2017, and thereafter), an audit conducted in accordance with the provisions of section 215.97, F.S., is not required. If the recipient expends less than $750,000 in state financial assistance in its fiscal and elects to have an audit conducted in accordance with the provisions of section 215.97, F.S., the cost of the audit must be paid from the nonstate entity's resources (i.e., the cost of such an audit must be paid from the recipient's resources obtained from other than state entities).

The Internet web addresses listed below will assist recipients in locating documents referenced in the text of this agreement and the interpretation of compliance issues.

State of Florida Department Financial Services (Chief Financial Officer)
http://www.myfloridacfo.com/

State of Florida Legislature (Statutes, Legislation relating to the Florida Single Audit Act)
http://www.leg.state.fl.us/

Part III: Report Submission

1. Copies of reporting packages for audits conducted in accordance with 2 CFR 200, Subpart F - Audit Requirements, and required by Part I of this agreement shall be submitted, when required by 2 CFR §200.512, by or on behalf of the recipient directly to each of the following:

    1. The Department of State at each of the following addresses:

Office of Inspector General
Florida Department of State
R. A. Gray Building
500 South Bronough St.
Tallahassee, FL 32399-0250

2. The Federal Audit Clearinghouse (FAC) as provided in 2 CFR §200.36 and §200.512.

   The FAC's website provides a data entry system and required forms for submitting the single audit reporting package. Updates to the location of the FAC and data entry system may be found at the OMB website.

2. Copies of financial reporting packages required by Part II of this agreement shall be submitted by or on behalf of the recipient directly to each of the following:

   1. The Department of State at each of the following addresses:

      Office of Inspector General
      Florida Department of State
      R. A. Gray Building
      500 South Bronough St.
      Tallahassee, FL 32399-0250

   2. The Auditor General's Office at the following address:

      Auditor General
      Local Government Audits/342
      Claude Pepper Building, Room 401
      111 West Madison Street
      Tallahassee, Florida 32399-1450

      The Auditor General's website (https://flauditor.gov/) provides instructions for filing an electronic copy of a financial reporting package.

3. Any reports, management letters, or other information required to be submitted to the Department of State pursuant to this agreement shall be submitted timely in accordance with 2 CFR §200.512, section 215.97, F.S., and Chapters 10.550 (local governmental entities) and 10.650 (nonprofit and for-profit organizations), Rules of the Auditor General, as applicable.

4. Recipients, when submitting financial reporting packages to the Department of State for audits done in accordance with 2 CFR 200, Subpart F - Audit Requirements, or Chapters 10.550 (local governmental entities) and 10.650 (nonprofit and for-profit organizations), Rules of the Auditor General, should indicate the date that the reporting package was delivered to the recipient in correspondence accompanying the reporting package.

Part IV: Record Retention

The recipient shall retain sufficient records demonstrating its compliance with the terms of the award(s) and this agreement for a period of five years from the date the audit report is issued, and shall allow the Department of State, or its designee, the CFO, or Auditor General access to such records upon request. The recipient shall ensure that audit working papers are made available to the Department of State, or its designee, the CFO, or Auditor General upon request for a period of at least three years from the date the audit report is issued, unless extended in writing by the Department

of State.

EXHIBIT 1

FEDERAL RESOURCES AWARDED TO THE RECIPIENT PURSUANT TO THIS AGREEMENT CONSIST OF THE FOLLOWING:

Not Applicable

COMPLIANCE REQUIREMENTS APPLICABLE TO THE FEDERAL RESOURCESAWARDED PURSUANT TO THIS AGREEMENT ARE AS FOLLOWS:

Not Applicable

STATE RESOURCES AWARDED TO THE RECIPIENT PURSUANT TO THIS AGREEMENT CONSIST OF THE FOLLOWING:

MATCHING RESOURCES FOR FEDERAL PROGRAMS:

Not applicable.

SUBJECT TO SECTION 215.97, FLORIDA STATUTES:

Not Applicable

COMPLIANCE REQUIREMENTS APPLICABLE TO STATE RESOURCES AWARDED PURSUANT TO THIS AGREEMENT ARE AS FOLLOWS:

The compliance requirements of this state project may be found in Part Four (State Project Compliance Requirements) of the State Projects Compliance Supplement located at https://apps.fldfs.com/fsaa/.

State of Florida

Chief Financial Officer
Department of Financial Services
Bureau of Accounting
200 East Gaines Street
Tallahassee, FL 32399-0354
Telephone: (850) 413-5519 Fax:(850) 413-5550

Substitute Form W-9

In order to comply with Internal Revenue Service (IRS) regulations, we require Taxpayer Identification information that will be used to determine whether you will receive a Form 1099 for payment(s) made to you by an agency of the State of Florida, and whether payments are subject to Federal withholding. The information provided below must match the information that you provide to the IRS for income tax reporting. Federal law requires the State of Florida to take backup withholding from certain future payments if you fail to provide the information requested.

Taxpayer Identification Number (FEIN): 59-6000355
IRS Name: TOWN OF LAKE PARK

Address: 535 PARK AVENUE
LAKE PARK, FL
33403-0000

Attention Of: FINANCE
In Care Of: DENA D DAVIS

Business Designation: Government Entity

Certification Statement:
Under penalties of perjury, I certify that:

1. The number shown on this form is my correct taxpayer information **AND**

2. **I am not** subject to backup withholding because:
   (a) I am exempt from backup withholding **or**
   (b) I have not been notified by the Internal Revenue Service (IRS) that I am subject to backup withholding as a result of failure to report all interest or dividends, **or**
   (c) the IRS has notified me that I am no longer subject to backup withholding **AND**

3. I am a U.S. citizen or other U.S. person (including U.S. resident alien)

Preparer's Name: DENA D DAVIS
Preparer's Title: CHIEF ACCOUNTANT
Phone: 561-881-3352
Email: DDAVIS@LAKEPARKFLORIDA.GOV

Date Submitted: 04/24/2018

REG
ARCHITECTS
since 1988

June 16, 2023

Historic Preservation Board
Town Hall Commission Chamber
535 Park Avenue
Lake Park, Florida 33403

Re: Lake Park Town Hall, 535 Park Avenue, West Palm Beach, FL 33403

Dear Mr. Viane,

We are confirming as the Architect of Record that our plans meet the historical preservation requirements of the Secretary of the Interior Standards for Rehabilitation with references to the applicable standards. Furthermore, we are preserving those portions and features which convey its historical, cultural, and architectural values.

Standards for Preservation

1. A property will be used as it was historically, or be given a new use that maximizes the retention of distinctive materials, features, spaces and spatial relationships. Where a treatment and use have not been identified, a property will be protected and, if necessary, stabilized until additional work may be undertaken.

   The proposed restoration and preservation work will not impact the current use to the property. The proposed restoration projects of, roof replacement, balcony concrete restoration, building waterproofing and painting will provide protection and long-term preservation of the building and its structural components.

2. The historic character of a property will be retained and preserved. The replacement of intact or repairable historic materials or alteration of features, spaces and spatial relationships that characterize a property will be avoided.

   The character of this historic property will not change. New materials introduced as part of the restoration work will be for replacement of existing deteriorated materials or restoration of compromised structural components. These restoration improvement projects are to ensure the long-term preservation of the structure and to provide a safe and operational facility for public and private use.

3. Each property will be recognized as a physical record of its time, place and use. Work needed to stabilize, consolidate and conserve existing historic materials and features will be physically and visually compatible, identifiable upon close inspection and properly documented for future research.

   Materials used in the restoration project will be in like kind of current availability in order to maintain the over historical integrity and design of the existing building.

4. Changes to a property that have acquired historic significance in their own right will be retained and preserved.

   Restoration work will look to minimize the introduction of any changes to the property that might impact the historical significance of this building.

5. Distinctive materials, features, finishes and construction techniques or examples of craftsmanship that characterize a property will be preserved.

   The proposed restoration work will maintain the distinctive features and finishes of the existing building.

6. The existing condition of historic features will be evaluated to determine the appropriate level of intervention needed. Where the severity of deterioration requires repair or limited replacement of a distinctive feature, the new material will match the old in composition, design, color and texture.

   A condition assessment will be performed to identify the level of deterioration and the actions for repair and or restoration.

7. Chemical or physical treatments, if appropriate, will be undertaken using the gentlest means possible. Treatments that cause damage to historic materials will not be used.

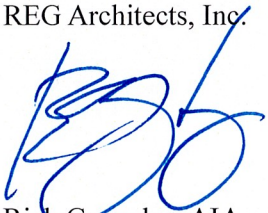
   This project is a building re-roof, balcony concrete restoration and waterproofing & painting; no destructive chemicals or adverse physical treatments will be used.

8. Archeological resources will be protected and preserved in place. If such resources must be disturbed, mitigation measures will be undertaken.

   Steps will be taken to protect and preserve Archeological resources if encountered.

Sincerely,

REG Architects, Inc.



Rick Gonzalez, AIA,
President

Cc: Manuel Ayala, AIA, LEED AP, Vice President/REG Architects, Inc.
John Wille/Town of Lake Park

WEST SIDE BALCONY with CONCRETE CANTILEVERED SUPPORT BEAMS

EAST SIDE BALCONY with CONCRETE CANTILEVERED SUPPORT BEAMS

Top side of Balcony Slab (East Side)

Font View of Town Hall Building
Damaged roof tiles along front edge of roof edge

East side view of Town Hall Building
Roof tile damage along roof ridge

TOWN OF LAKE PARK

Town Hall Re-Roof & Exterior Restoration

535 Park Avenue, Lake Park, FL 33403


SOUTH - WEST VIEW


EAST ELEVATION VIEW

Construction Document Set 04.10.2023

Sheet List			
Sheet Number	Sheet Name	Rev. #	Rev. Date
Architectural			
A-0	COVER PAGE		
A-1	HISTORICAL SIGNIFICANCE		
A-2	EXISTING SITE AERIAL		
A-3	EXISTING SITE PLAN		
A-4	EXTERIOR ROOF AERIAL REFERENCE IMAGES		
A-5	EXISTING EXTERIOR IMAGES		
A-6	EXISTING EXTERIOR IMAGES		
A-7	EXISTING EXTERIOR IMAGES		
A-8	EXTERIOR ROOF AERIAL REFERENCE IMAGES		
A-9	EXTERIOR ROOF AERIAL REFERENCE IMAGES		
A-10	EXTERIOR ROOF AERIAL REFERENCE IMAGES		
A-11	FLOOR PLANS		
A-11b	INTERIOR IMAGES		
A-11c	ROOF PLAN - RE-ROOFING		
A-12	BUILDING ELEVATIONS - EXTERIOR PAINTING		
A-13	BUILDING ELEVATIONS - EXTERIOR PAINTING		
A-15	BARREL CLAY TILE SPECIFICATIONS		
A-16	PAINT SPECIFICATIONS COLORTOP		

Sheet List			
Sheet Number	Sheet Name	Rev. #	Rev. Date
A-16b	PAINT SPECIFICATIONS SHERWIN WILLIAMS		
A-16c	PAINT SPECIFICATIONS SHERWIN WILLIAMS		
A-17	ROOF HATCH SPECIFICATIONS		
A-18	HISTORIC PRESERVATION STANDARDS & GUIDELINES		
A-20	HG - EXTERIOR CLEANING		
A-21	HG - GUTTERS & DOWNSPOUTS MAINTANCE		
A-22	HG - WINDOWS		
A-23	HG - WINDOWS		
A-24	HG - STUCCO		
A-25	HG - STUCCO		
A-26	HG - STUCCO		
A-27	HG - MOISTURE CONTROL		
A-28	HG - MOISTURE CONTROL		
A-29	HG - MOISTURE CONTROL		
A-30	HG - MOISTURE CONTROL		
A-31	HG - MOISTURE CONTROL		
A-32	HG - MOISTURE CONTROL		
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S-1	GENERAL NOTES & LOCATION MAP		
S-2	WEST SIDE CONCRETE RESTORATION		
S-3	EAST SIDE CONCRETE RESTORATION		
S-4	CONCRETE REPAIRS DETAILS AND PRODUCT SPECIFICATIONS		
S-5	CONCRETE REPAIRS PRODUCT SPECIFICATIONS		
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SR-1	STRUCTURAL REPORT		
SR-2	STRUCTURAL REPORT		
SR-3	STRUCTURAL REPORT		
SR-4	STRUCTURAL REPORT		

OWNER'S NAME

TOWN OF LAKE PARK
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PHONE: 561-353- 1152

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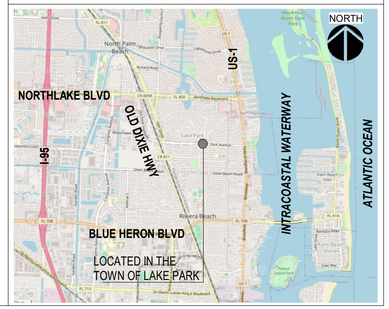
DJACKSON@ONMJ.NET

PROJECT SCOPE

TOWN HALL RE-ROOF & EXTERIOR RESTORATION, PAINTING, WATERPROOFING AND STRUCTURAL BALCONY REPAIR WORK.

CONTRACTOR TO PROVIDE JOB SIGNAGE AS REQUIRED BY THE FLORIDA DEPARTMENT OF STATE, DIVISION OF HISTORICAL RESOURCES AS REQUIRED BY THE GRANT CONTRACT WITH TOWN OF LAKE PARK. SIGNAGE IS SIMILAR TO ONE PICTURED TO THE RIGHT.

LOCATION MAP



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TOWN OF LAKE PARK WELCOME

Historical Resources

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COVER PAGE

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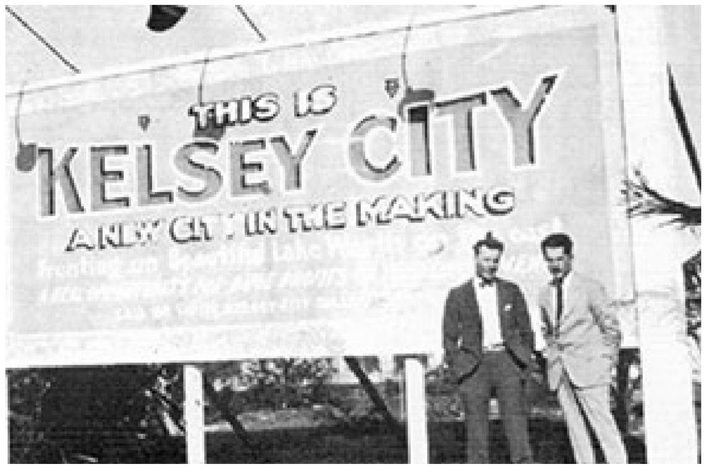
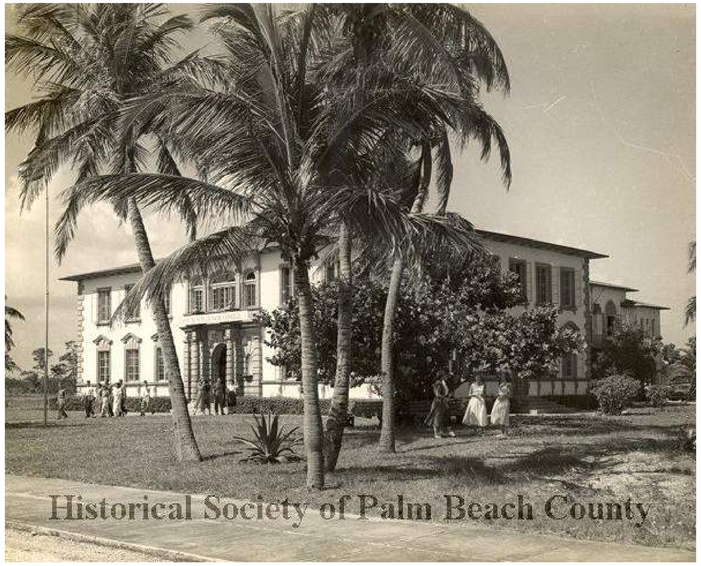
LAKE PARK TOWN HALL FACADE ARCHITECTURAL DETAILING

TOWN FOUNDER HARRY KELSEY



ADVERTISEMENT FROM HARRY KELSEY'S NEW CITY IN 1923

SIGNAGE HISTORICAL PRESERVATION SIGNIFICANCE, 1999



HISTORICAL SIGNIFICANCE OF LAKE PARK TOWN HALL

Boston entrepreneur Harry S. Kelsey founded Kelsey City in 1921. He envisioned his town as a resort mecca and winter retreat for wealthy northerners. The Town hall was designed by architect Bruce Kitchell in 1927 and was built by Arnold Construction Company. Constructed of stuccoed brick and clay tile, this Mediterranean Revival jewel has stylistic features reflective of the late Italian Renaissance, including a rusticated frontispiece, decorative window surrounds and a water table supported by brackets. The Town Hall originally housed the Police and Fire Departments, Town Administration, Library, and Municipal Courtroom. The land boom collapse in the mid 1920s and the hurricane of 1928, in which the Town Hall served as a shelter for residents, nearly devastated the city. Service organizations provided diversions for those who remained. The Fire Department sponsored dances here in the Mirror Ballroom on the second floor. The ballroom was used for many other social events, such as theatrical performances by the Palm Beach Junior College, which occupied the Town Hall in the 1950s. In 1939 the town changed its name to the Town of Lake Park. Lake Park Town Hall was listed in the National Register of Historic Places in 1981.

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HISTORICAL SIGNIFICANCE

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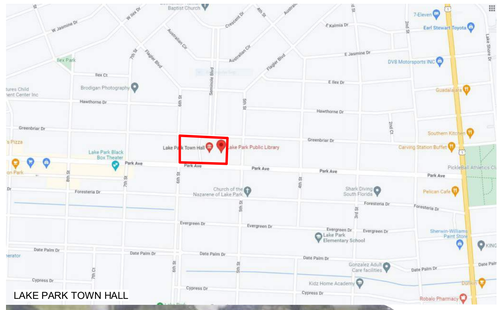

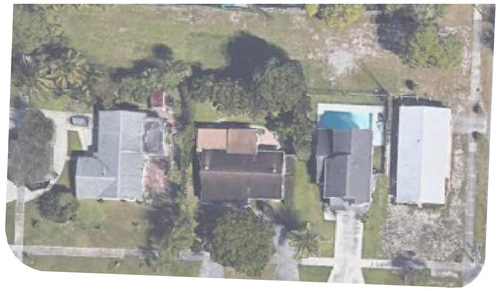

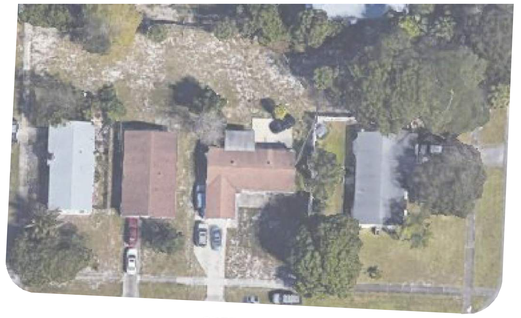

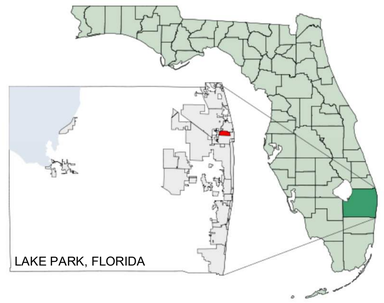

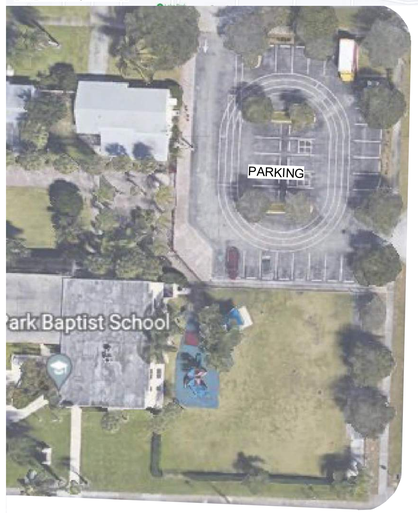

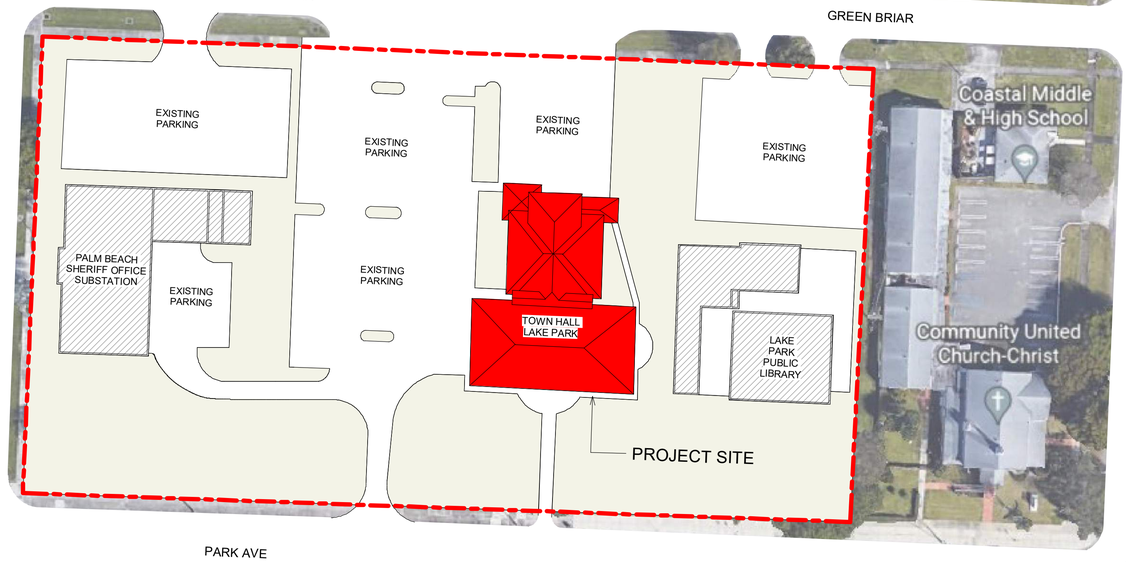

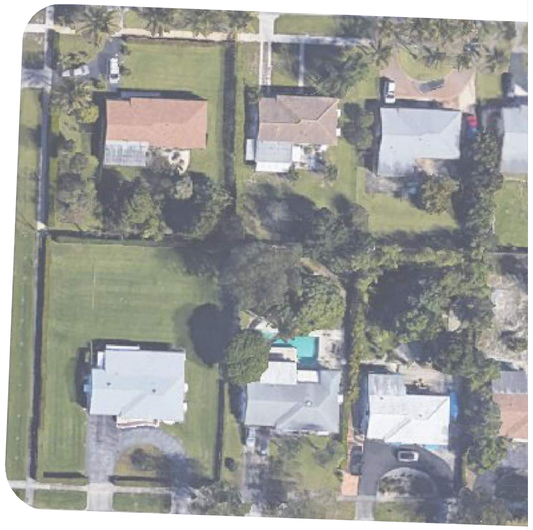

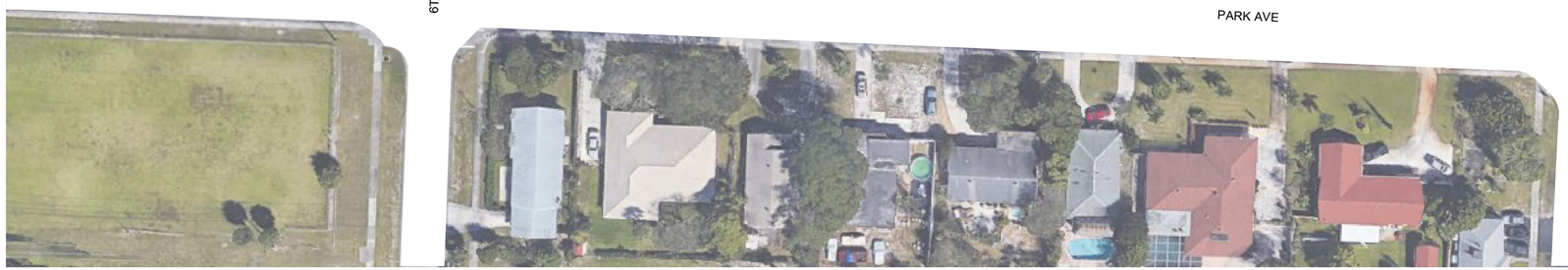

1 EXISTING SITE AERIAL
1" = 40'-0"

ARCHITECTURAL SITE PLAN FOR INFORMATIONAL PURPOSES ONLY; SEE SITE PLAN BY OTHERS.

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EXISTING SITE AERIAL

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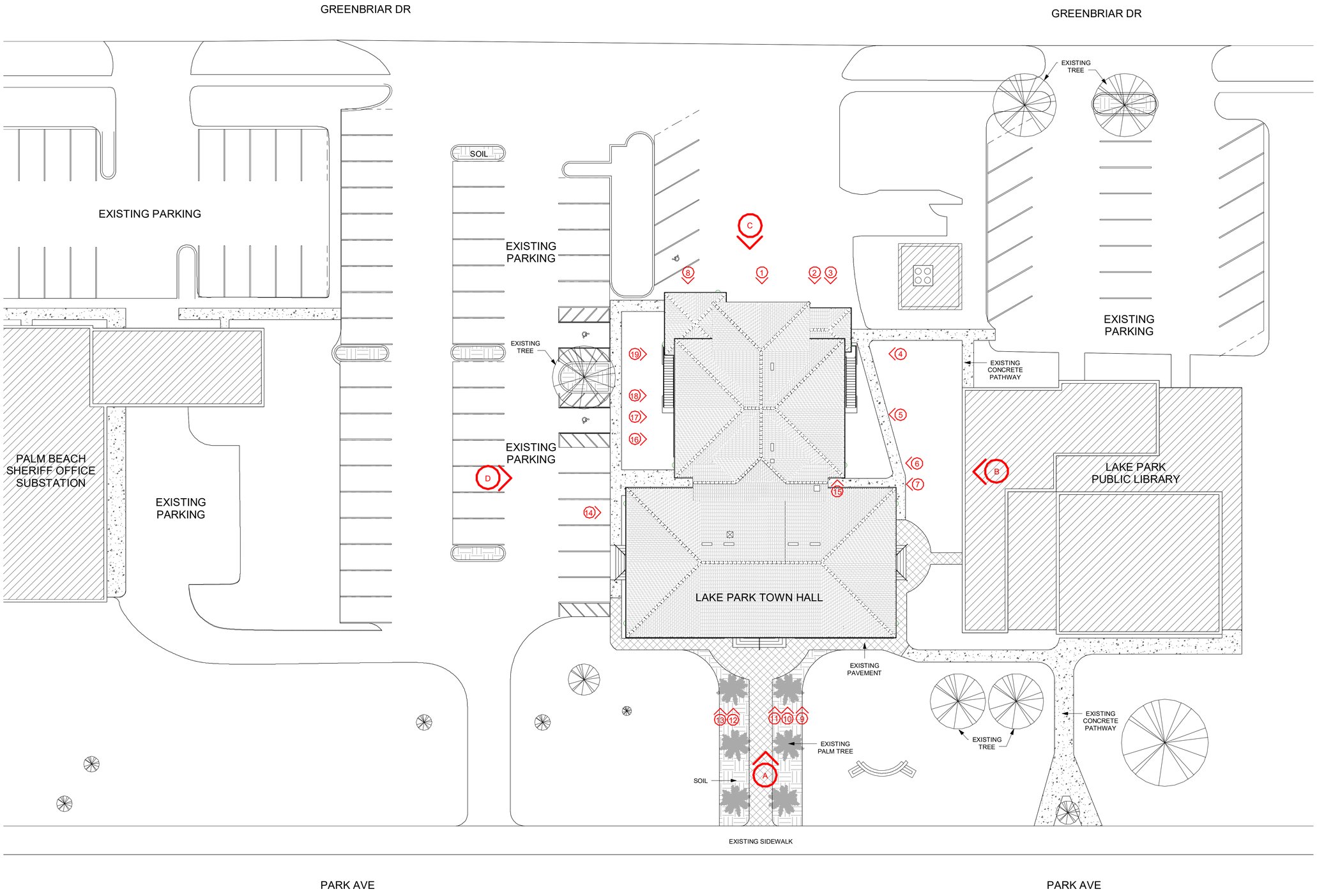

1 SITE PLAN
1/16" = 1'-0"

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EXISTING SITE PLAN

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A SOUTH VIEW

B EAST VIEW

C NORTH VIEW

D WEST VIEW

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EXTERIOR ROOF AERIAL REFERENCE IMAGES

Construction Document Set

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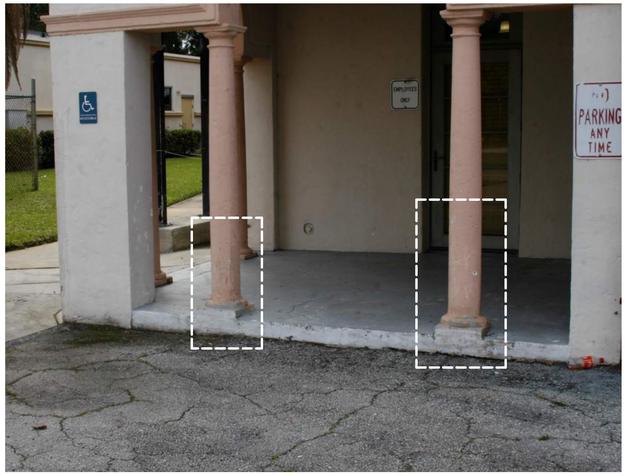
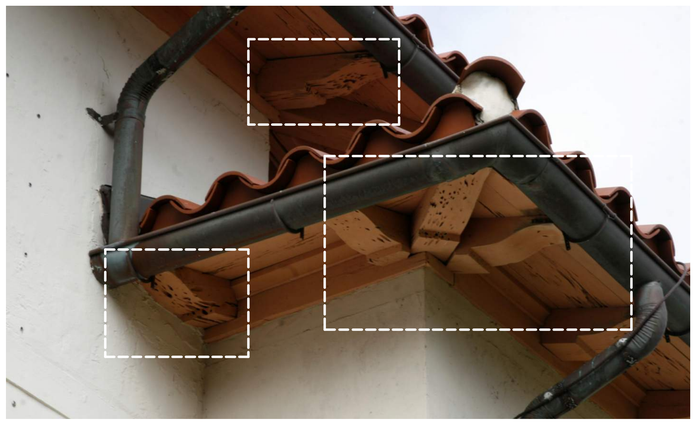
NORTH ELEVATION: FACADE DISCOLORATION. V.I.F. 1



NORTH ELEVATION: LOCALIZED DAMAGED ALONG LENGTH THE OF COLUMNS. V.I.F. 2

NORTH ELEVATION: STRUCTURAL DAMAGE ON FLOOR SLAB. REFER TO S-4 CONCRETE REPAIRS' DETAILS AND PRODUCT SPECIFICATIONS. 3



EAST ELEVATION: DAMAGE ON RAFTERTAILS. V.I.F. 4

EAST ELEVATION: WATER DAMAGE ON FINISHED SURFACE. REFER A-23, A-24, A-25 STUCCO FOR STUCCO REPAIRS AND COLOR APPLICATION.
REFER TO S-3 FOR STRUCTURAL REPAIRS ON BALCONY'S SLAB.
PRESENCE OF RUST ON METAL STAIRS AND ASSOCIATED RAILING. REFER TO A-16c FOR EXTERIOR PAINT COATING SYSTEMS AND SURFACE PREPARATION. 5

EAST ELEVATION: BUILT-UP OF MOLD ON BALCONY SLABS. REFER TO A-20 EXTERIOR CLEANING.
ASSESS STRUCTURAL INTEGRITY OF SLAB. REFER TO S-4 IF DAMAGE IS PRESENT. 6

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EXISTING EXTERIOR IMAGES

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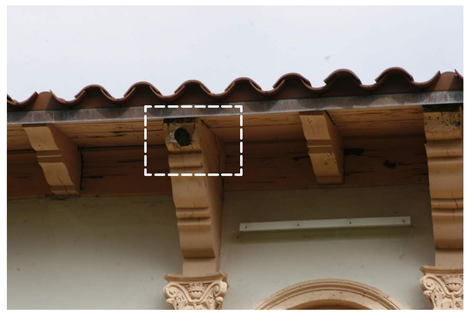
EAST ELEVATION: WATERMARKS AND LOCALIZED CLUSTERS OF MOLD. REFER TO A-20 EXTERIOR CLEANING AND A-24 STUCCO FOR STUCCO REPAIR AND COLOR APPLICATION. 7

SOUTH ELEVATION: ROTTED RAFTER TAIL. CRACKED WINDOW EXTERIOR MOLDING 8

SOUTH ELEVATION: CHIPPED PAINT ON HEAD CASING. TYP. REFER TO A-21 AND A-22 WINDOWS FOR INSPECTION AND REPAIR GUIDELINES 9

SOUTH ELEVATION: ASSESS DETERIORATION OF PAINT COAT ON RAFTERTAILS AND REPAIR AS NECESSARY. 10

SOUTH ELEVATION: BUILD-UP OF MOLD ON LEGDE SURFACE. REFER TO A-20 EXTERIOR CLEANING. 11



SOUTH ELEVATION: FOREIGN OBJECT EMBEDDED ON RAFTERTAIL. V.I.F. REMOVE AND REPAIR RAFTERTAIL. 12

SOUTH ELEVATION: DETERIORATION OF PAINT COAT ON RAFTERTAILS. REPAIR AS NECESSARY. 13

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EXISTING EXTERIOR IMAGES

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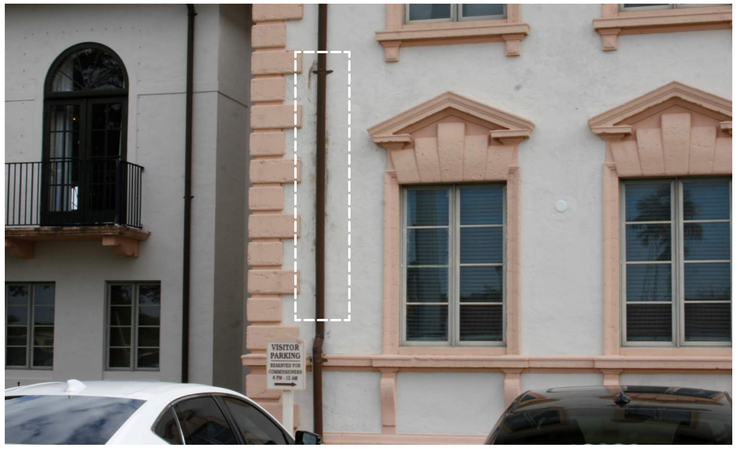


WEST ELEVATION: SURFACE DAMAGE DUE TO RUST. V.I.F. REFER TO A-20 EXTERIOR CLEANING AND A-23, A-24, AND A-25 STUCCO FOR STUCCO REPAIS AND COLOR APPLICATION.

14

SOTH ELEVATION: DAMAGE ON FINISH COAT. ASSESS THE EXTENT OF DAMAGED AND INTEGRITY OF THE AREA IN THE FIELD. TYP. REFER TO SHEETS A-23, A-24 AND A-25 STUCCO.

15

WEST ELEVATION: BUILD-UP OF MOLD ON SLAB. REFER TO A-20 EXTERIOR CLEANING.
STRUCTURAL DAMAGED ON RAFTERTAIL. REFER TO S-4 CONCRETE REPAIRS' DETAILS AND PRODUCT SPECIFICATIONS.

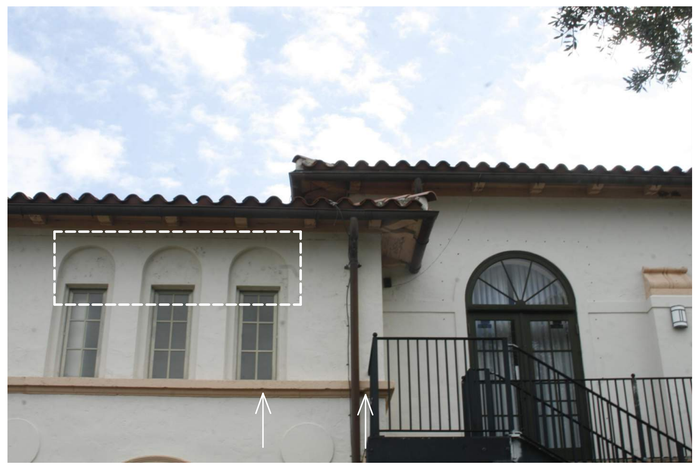
16

WEST ELEVATION: LOCALIZED CLUSTERS OF UNKNOWN MATERIAL. REFER TO A-20 EXTERIOR CLEANING. V.I.F.

17

WEST ELEVATION: STRUCTURAL DAMAGED ON RAFTERTAIL AND BALCONY SLAB. REFER TO S-4 CONCRETE REPAIRS' DETAILS AND PRODUCT SPECIFICATIONS. V.I.F.
REFER TO S-2 IF DAMAGE ON BALCONY SLAB IS PRESENT.
PRESENCE OF RUST ON METAL STAIRS AND ASSOCIATED RAILING. REFER TO A-16c FOR EXTERIOR PAINT COATING SYSTEMS AND SURFACE PREPARATION.

18



WEST ELEVATION: VERIFY CONDITION OF MOLDING. DETERIORATED STUCCO OR PAINT COAT. V.I.F. IF STUCCO, REFER TO A-23, A-24, A-25 STUCCO FOR STUCCO REPAIS AND COLOR APPLICATION.

19

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EXISTING EXTERIOR IMAGES

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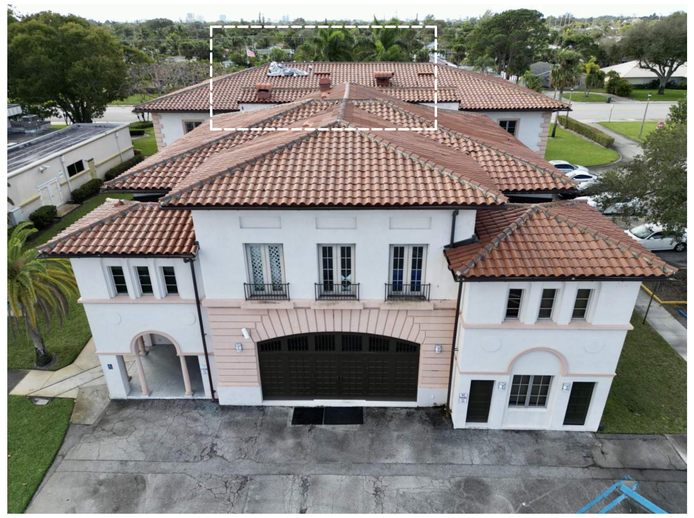
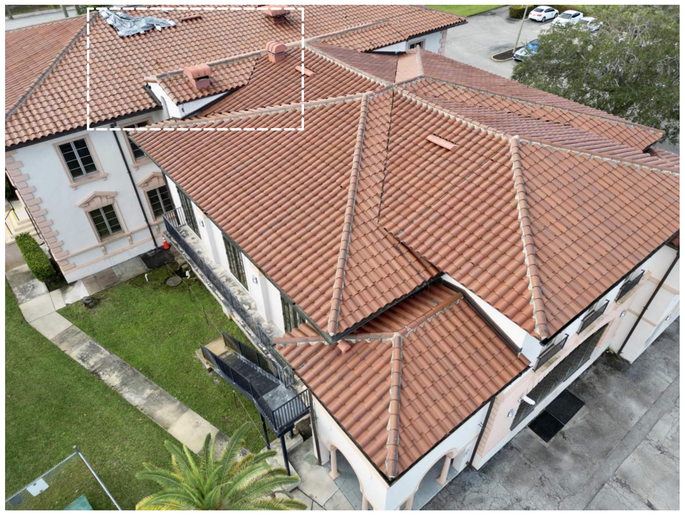


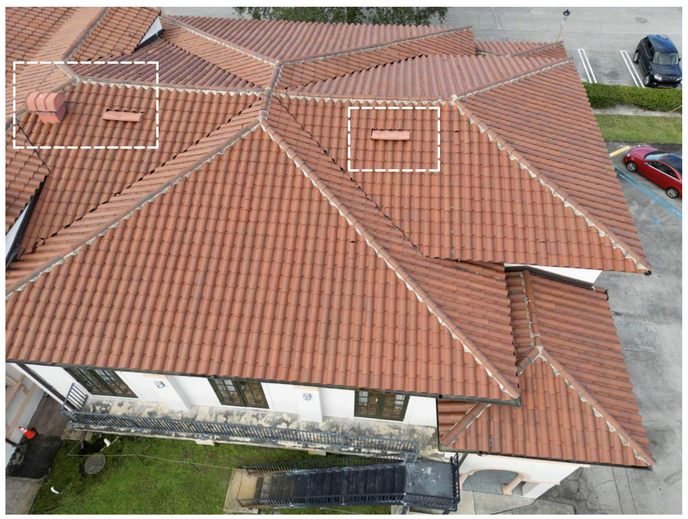
EXISTING ROOF: NORTH AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING NORTH - EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.



EXISTING ROOF CONDITION: NORTH - EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING ROOF CONDITION: EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.



EXISTING EAST AERIAL VIEW/
REMOVE ALL VENTS AS REQUIRED.

EXISTING ROOF CONDITION: TOP VIEW/
REMOVE ALL VENTS AS REQUIRED.

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EXTERIOR ROOF AERIAL REFERENCE IMAGES

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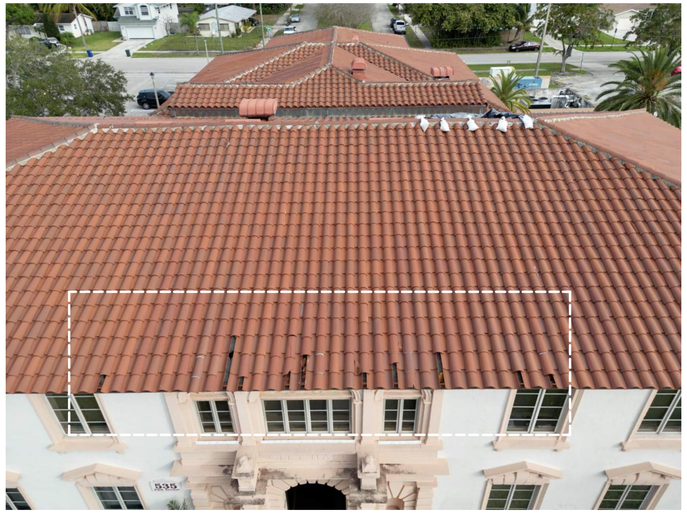
MAIN ENTRANCE: SOUTH AERIAL VIEW ROOF CONDITION, MISSING ROOF TILES.



SOUTH AERIAL ROOF VIEW / MISSING AND CHIPPED ROOF TILES, REMOVE ALL VENTS AS REQUIRED.

SOUTH AERIAL ROOF VIEW / MISSING AND CHIPPED ROOF TILES, REMOVE ALL VENTS AS REQUIRED.

ROOF: SOUTH - WEST AERIAL VIEW, REMOVE ALL VENTS AS REQUIRED.

ROOF CONDITION: WEST AERIAL VIEW, REMOVE ALL VENTS AS REQUIRED.

WEST AERIAL VIEW ROOF CONDITION, REMOVE ALL VENTS AS REQUIRED.

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EXTERIOR ROOF AERIAL REFERENCE IMAGES

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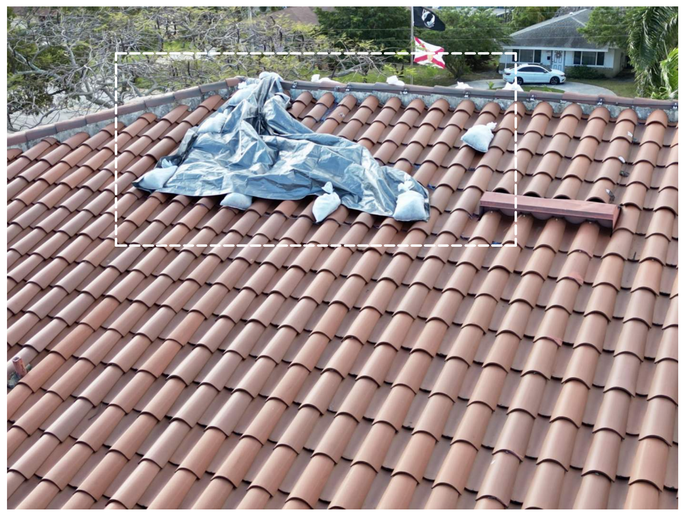
DISCOLORATION OF ROOF TILE,
REMOVE ALL VENTS AS REQUIRED.

EXISTING ROOF EXHAUST VENT SHALL BE REMOVED

LEAKAGE ON EXISTING ROOF,
WATER INTRUSION



ROOF LEAK SHALL BE REPAIRED

PARTIAL DAMAGE (EXPOSED ROOF)

PARTIAL DAMAGE (EXPOSED ROOF)

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EXTERIOR ROOF AERIAL REFERENCE IMAGES

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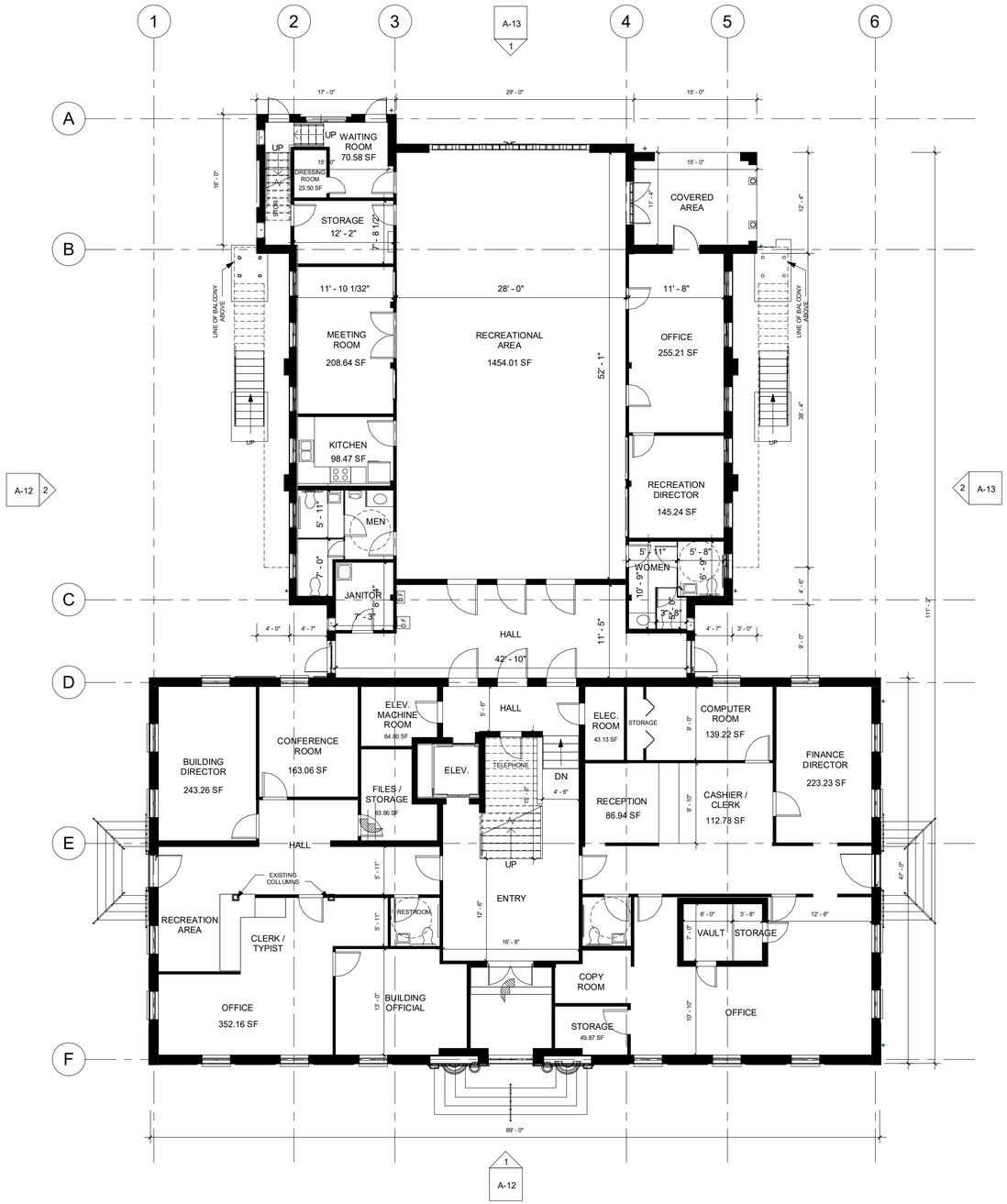
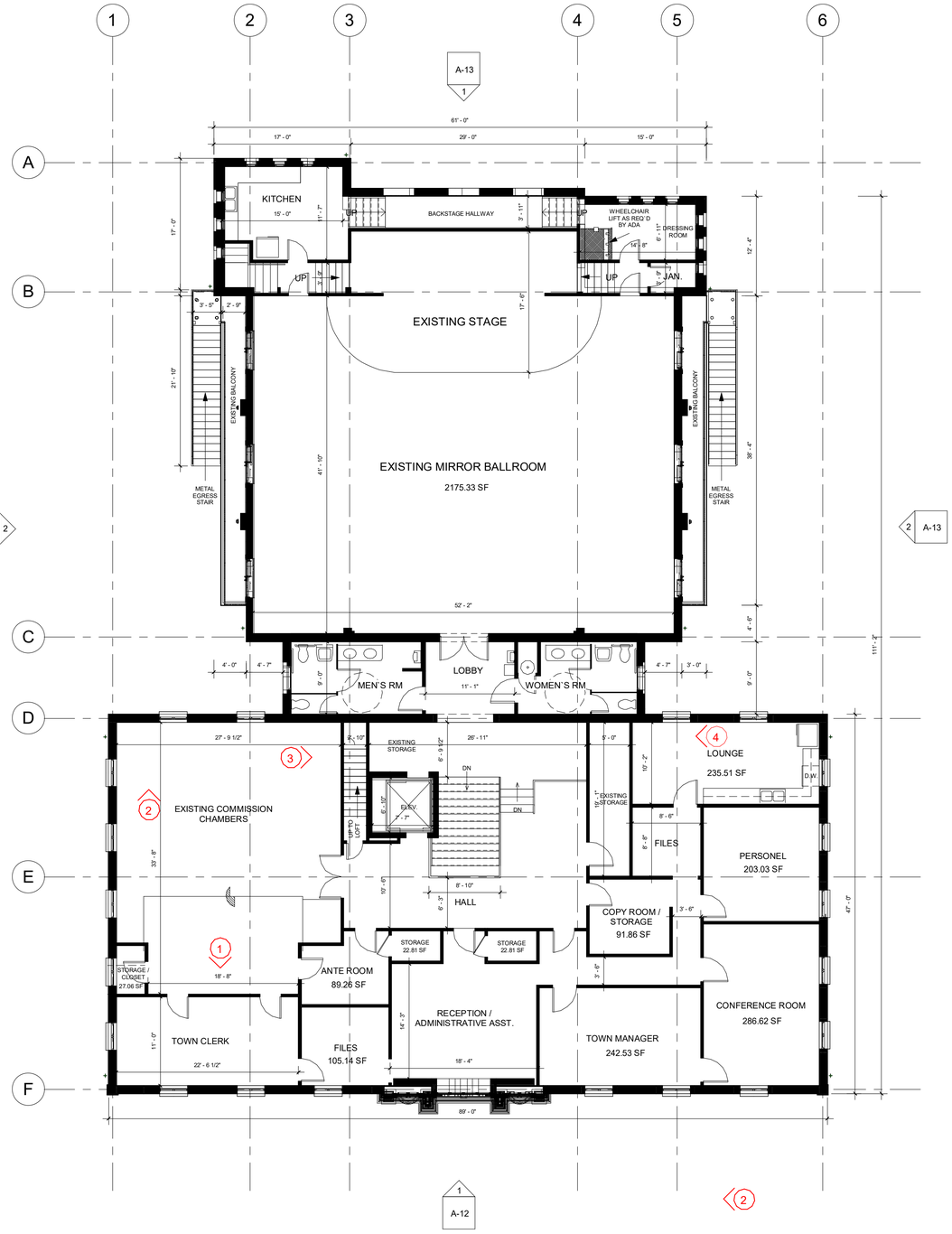


1 EXISTING FIRST FLOOR PLAN
1/8" = 1'-0"



2 EXISTING SECOND FLOOR PLAN
1/8" = 1'-0"

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TOWN OF LAKE PARK WELCOME

Historical Resources

Town Hall Structural Roof Replacement & Exterior Restoration

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FLOOR PLANS

Construction Document Set

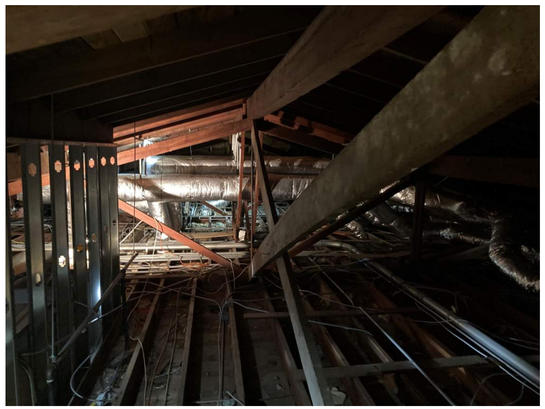
A-11

DETERIORATED COFFERED CEILING COMPONENTS; SAGGING. REFFER TO SR-1, SR-2, SR-3, SR-4 STRUCTURAL REPORT. 1

DETERIORATED COFFERED CEILING COMPONENTS; OVERALL SURFACE DECAY. REFFER TO SR-1, SR-2, SR-3, SR-4 STRUCTURAL REPORT. 2

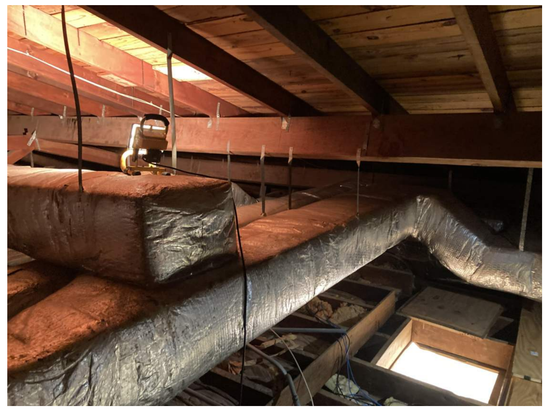
DETERIORATED COFFERED CEILING COMPONENTS; SHIFTING. REFFER TO SR-1, SR-2, SR-3, SR-4 STRUCTURAL REPORT. 3

WATER DAMAGE ON CEILING. REFER TO A-26, A-27, A-28, A-29, A-30, A-31 MOISTURE CONTROL. 4



WOOD ROOF FRAMING STRUCTURE W/ WOOD ROOF TRUSSES

WOOD ROOF FRAMING STRUCTURE SYSTEM



DUCT SYSTEM UNDER ROOF BEAMS

METAL FRAMING SYSTEM UNDER ROOF

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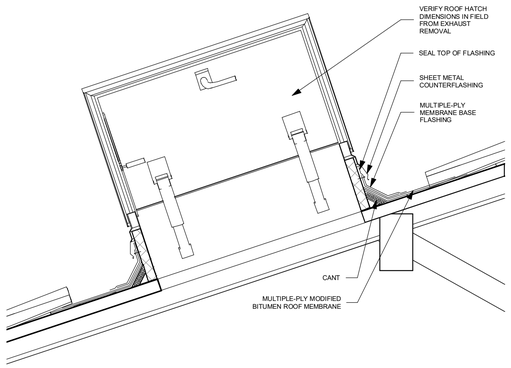
INTERIOR IMAGES

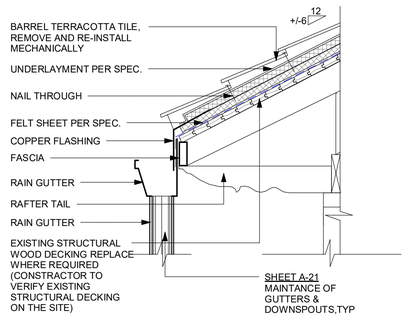
Construction Document Set

A-11b

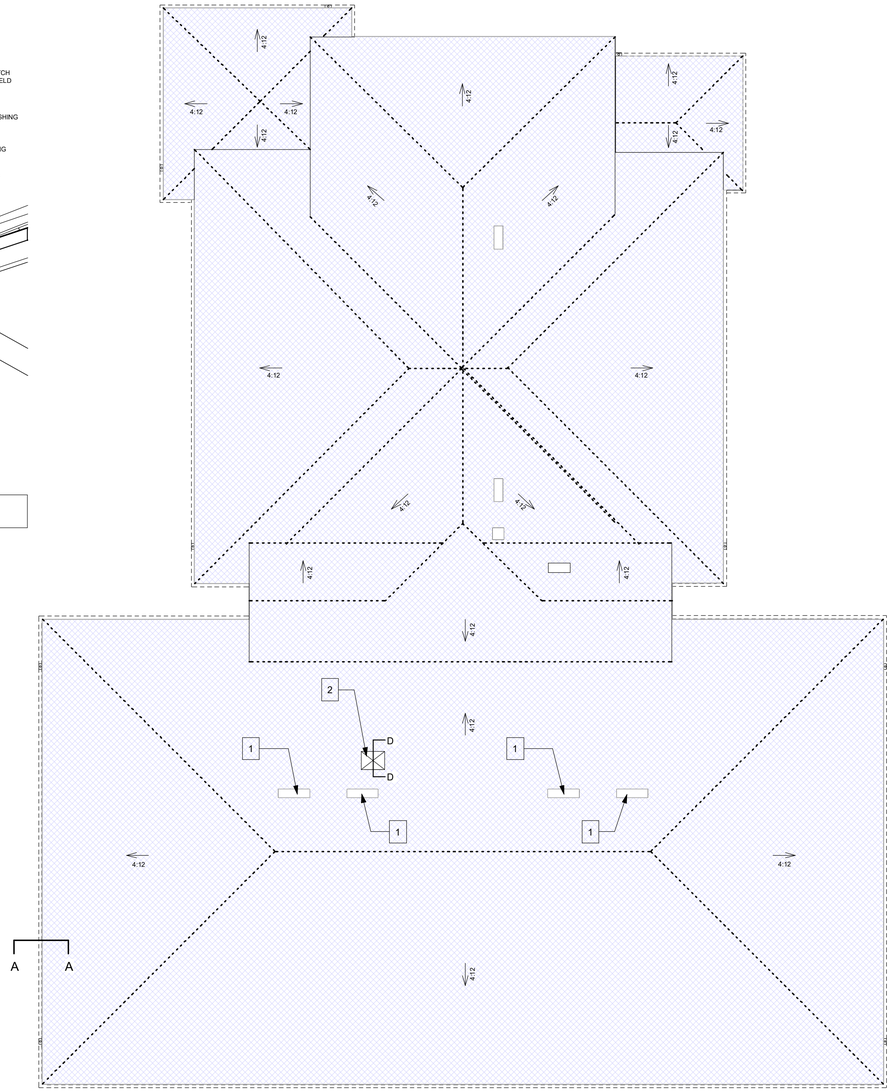


VERIFY HATCH DIMENSION IN FIELD FROM EXHAUST REMOVAL FOR CUSTOM MODEL
WHERE W=18"-36" AND L=18"-30"

② Roof Hatch Section D - D
1" = 1'-0"



③ ROOF DETAIL A - A
1 1/2" = 1'-0"



ALL DIMENSIONS ARE APPROX. CONTRACTOR TO VERIFY IN FIELD

ROOF NOTES:

1.- REMOVE EXHAUST VENT TYP. COVER WITH SOLID PLYWOOD SHEATING ROOF OVER

2.- REPLACE EXISTING EXHAUST VENT WITH ROOF HATCH BASIS OF DESIGN BILCO

NORTH

① ROOF PLAN - RE-ROOF
1/8" = 1'-0"

RE-ROOF PLAN LEGEND

- BARREL CLAY TILE ROOF (SEE SPECIFICATIONS SHEET A-17)
- CHANGE OF SLOPE
- GUTTER - EXISTING
- COLLECTOR BOXES, CONDUCTOR
- EXISTING EXHAUST
- EXISTING SLOPE
- ACCESS HATCH (SEE SPECIFICATIONS SHEET A-18)

SCOPE OF WORK:

1. REMOVE EXISTING ROOF UNDERLAYMENT AND BARREL CLAY TILES.
2. CHECK SHEATHING FOR FIXING OR REPLACEMENT IF DAMAGED OR ROTTED. INCLUDE ALLOWANCE IN BASE BID FOR REPLACEMENT OF UP TO 10% OF ROOF SHEATHING AND FASCIA.
3. INSTALL NEW ROOF MEMBRANE AND BARREL CLAY TILES SAME SIZE
4. PHOTO DOCUMENT ALL STEPS OF EXISTING, REMOVAL, UNDERLAYMENT AND INSTALL.
5. ALL EXISTING ROOF FLASHING REPLACE TO COPPER ROOF FLASHING.

RE-ROOF CODE RESEARCH ANALYSIS

APPLICABLE BUILDING CODE

FLORIDA BUILDING CODE - EXISTING BUILDING (FBC-EB 2020) - Including Historic Rehabilitation

FLORIDA BUILDING CODE - BUILDING (FBC-B 2020)

FLORIDA BUILDING CODE - BUILDING (FBC-B 2020)

CHAPTER 15 - ROOF ASSEMBLIES AND ROOFTOP STRUCTURES
- TABLE 1505.1 *MINIMUM ROOF COVERING CLASSIFICATION* - CLASS C ROOF ASSEMBLY
- SHALL COMPLY WITH APPLICABLE SECTIONS SPECIFICALLY 1504.3.1, 1504.5, 1504.6, 1504.7 AND 1504.8
- SHALL COMPLY WITH APPLICABLE SECTIONS SPECIFICALLY 1506
- SHALL COMPLY WITH APPLICABLE SECTIONS SPECIFICALLY 1507.3 (CLAY & CONC. TILE*), AND 1507.6 (MINERAL SURFACED ROLL ROOFING)

CHAPTER 16 STRUCTURAL DESIGN
- SHALL COMPLY WITH SECTION 1609 WIND LOADS, SEE STRUCTURAL

FLORIDA BUILDING CODE - EXISTING BUILDING (FBC-EB 2020)

CHAPTER 12 - HISTORIC BUILDINGS
- SHALL COMPLY WITH ALL REQUIREMENTS OF SECTION 1202 *HISTORIC PRESERVATION*

CHAPTER 4 - REPAIRS
- SPECIFICALLY SECTION 402.3 *REPLACEMENT*

CHAPTER 7 - ALTERATIONS - LEVEL 1
- SECTION 706.4 *ROOF RECOVERING*

CHAPTER 12 - HISTORIC BUILDINGS
- SUBJECT BUILDING IS A DESIGNATED HISTORIC LANDMARK IN THE CITY
- COMPLY WITH SECTION 1203 *STANDARDS AND GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS*

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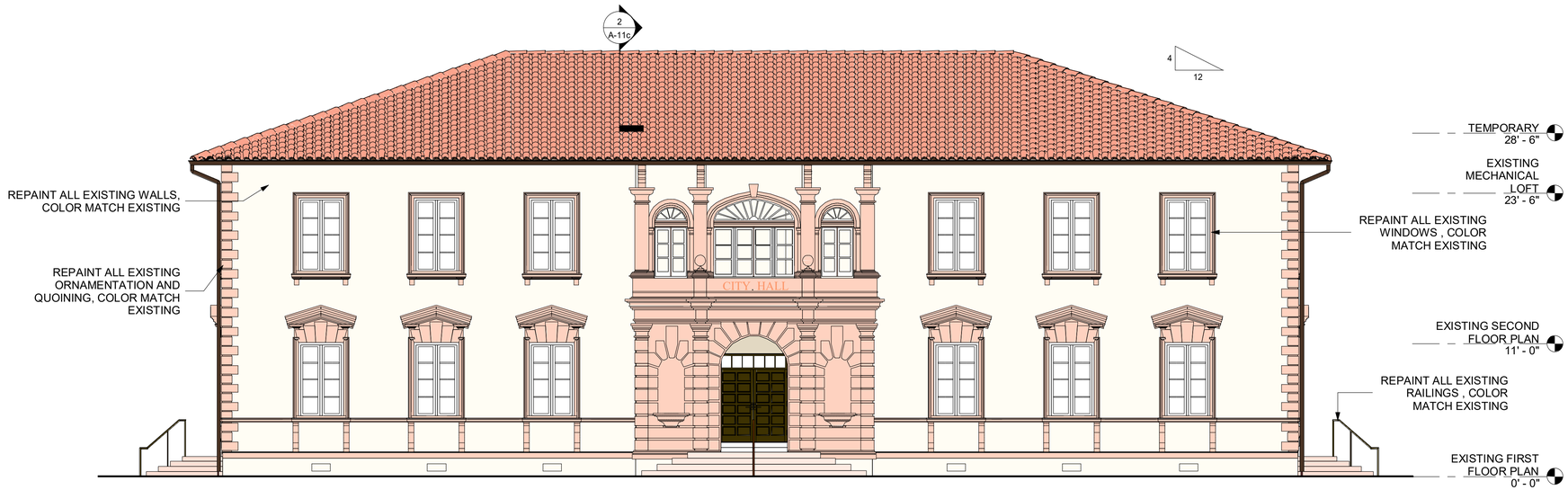
ROOF PLAN - RE-ROOFING

Construction Document Set

A-11c



1 South Elevation
3/16" = 1'-0"

2 West Elevation
3/16" = 1'-0"

PAINT LEGEND

- Stucco paint, color match existing
- Stucco paint, color match existing

Refer to sheet A-14 AND A-15 for paint specifict

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Florida Department of State Division of Historical Resources

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BUILDING ELEVATIONS - EXTERIOR PAINTING

Construction Document Set

A-12

1 North Elevation
3/16" = 1'-0"

2 East Elevation
3/16" = 1'-0"

PAINT LEGEND
Stucco paint, color match existing
Stucco paint, color match existing
Refer to sheet A-14 AND A-15 for paint specifict

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BUILDING ELEVATIONS - EXTERIOR PAINTING

Construction Document Set

A-13

SECTION 073213
CLAY ROOF TILES

PART 1 GENERAL

1.1 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions, and General Requirements agreed to between Owner and Contactor, shall apply to this Section.

1.2 SECTION INCLUDES

A. Clay roof tiles and accessories.

1.3 REFERENCES

A. ASTM C91 - Standard Specification for Masonry Cement.

B. ASTM C144 - Standard Specification for Aggregate for Masonry Mortar.

C. ASTM C1167 - Standard Specification for Clay Roof Tiles.

D. ASTM D1970 - Standard Specification for Self-Adhering Polymer Modified Bituminous Sheet Materials.

E. ISO 9001 - Quality Management Systems.

F. ISO 14001 - Environmental Management.

G. Florida Roofing, Sheet Metal and Air Conditioning Contractors Association Inc. (FRSA) and Tile Roofing Institute (TRI):

1. Concrete and Clay Roof Tile Installation Manual.
2. Mechanically Fastened Tile Guidelines.

H. Florida Building Code

1.4 SUBMITTALS

A. Product Data: Submit manufacturers current published data on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.

B. Certificates:

1. Manufacturer and independent testing agency test certifications or compliance reports.

C. Shop Drawings:

1. Dimensioned scale drawings and details indicating tile layout, location of cut outs, penetrations and roof mounted equipment, special shapes and trims, with all thicknesses and interface between materials and adjacent construction.
2. Size and location of flashing, fasteners, joint locations, installation details, tile layouts, wind pressures and thermal movements.
3. Installation details including flashing, roof edges, roof slope limitations, penetrations, and drainage paths.

D. Verification Samples: Three to five full size units indicating full range of color and texture to be expected in the final installation.

E. Qualifications: For installer and manufacturer.

F. Closeout Submittals:

1. Maintenance instructions.
2. Warranty.

1.5 QUALITY ASSURANCE

A. Clay roofing tile materials and installation shall meet or exceed the following:

1. Local building code requirements.
2. Freeze-Thaw Cycles: Minimum 150.
3. Transverse Breaking Strength: Minimum 800 pounds (362 kg).
4. Recycled Content: Minimum 25 percent.

B. Qualifications Manufacturing plant shall comply with ISO 9001 and 14001 requirements.

C. Mock-Up:

1. Provide mock-up of each type of assembly including associated components, accessories, and methods of adjoining construction.
2. Minimum size: 9 x 9 feet (3 x 3 meters).
3. Accepted mock-up may remain as part of the completed work.

1.6 DELIVERY, STORAGE, AND HANDLING

A. Coordinate delivery schedule with the General Contractor and project schedule to minimize on site storage.

1. Store on end, on pallets or other raised surfaces. Do not double-stack rolls.

B. Store underlayment rolls in a dry, well-ventilated location protected from weather, sunlight, and moisture in accordance with manufacturer's written instructions.

C. Do not exceed structural loading with workers or installation materials. Install temporary battens where required.

1.7 FIELD CONDITIONS

A. Environmental Limitations: Proceed with installation only when existing and forecasted weather conditions permit product installation and related Work to be performed in accordance with manufacturer's written instructions and warranty requirements.

1. Install self-adhering, polymer-modified bitumen sheet underlayment within the range of ambient and substrate temperatures recommended in writing by manufacturer.

1.8 WARRANTY

A. Product Warranty: Manufacturers standard warranty against deficiencies in materials or fabrication.

1. Warranty Period: 50 years minimum from date of Substantial Completion.

PART 2 PRODUCTS

2.1 SOURCE LIMITATIONS

A. Obtain each type of product from single source from single manufacturer.

2.2 MANUFACTURERS

A. Subject to compliance with requirements, manufacturer's offering acceptable products include the following:

1. CeramicaVerea USA – Basis of Design
2. Boral
3. Santa Fe Tile

2.3 CLAY ROOF TILES

A. Description: One-piece overlapping units to meet ASTM C1167, Grade I.

1. Dimensions: 19-3/4 inch long by 8-1/4 inch wide by 3 inch high (501 mm long by 209 mm wide by 76 mm high).
2. Weight: 5.2 pounds (2.36 kg).
3. Pieces per 100 square feet (9.29 square meters) with 3 inch (76 mm) overlap: 154.
4. Color Blend
   a. Covers: 60% Vintage, 20% Ohio Red, 20% Brown
   b. Pans: 50% Ohio Red, 50% Brown.

2.4 UNDERLAYMENT

A. Felt: ASTM D226/D226M Type II, asphalt saturated, unperforated.

B. Self-Adhering, Polymer-Modified Bitumen Sheet: ASTM D1970/D1970M, minimum 40-mil- (1.0-mm-) thick sheet; glass-fiber-mat-reinforced, polymer-modified asphalt; with slip-

resistant top surface and release backing; cold applied; and recommended in writing by manufacturer for use in tile roofing system required.

2.5 ACCESSORIES

A. Substrate Materials:

1. Decking: Solid, structural material adequate to meet project loading requirements.

B. Asphalt Roofing Cement: ASTM D4586/D4586M Type II, asbestos free.

C. Butyl Sealant: ASTM C1311, single-component, solvent-release butyl rubber sealant; polyisobutylene plasticized; heavy bodied.

D. Mortar: Factory premixed, bagged, and approved by the local building authority. Job site mixtures will be permitted for cosmetic purposes only.

1. Cement: To ASTM C91, Type M.
2. Sand: to ASTM C144, uniformly graded, clean and free from organic materials.
3. Lightweight Aggregate: to ASTM C332.

E. Foam Adhesive: Two-component, polyurethane expanding adhesive recommended in writing for application by clay-roof-tile manufacturer.

F. Provide manufacturer's accessory trim and clay roof pieces for use at hips, rakes, ridges, and valley terminations manufactured for each tile profile, including but not limited to the following:

1. Hip / Ridge tiles.
2. 3-Way ridge tiles.
3. 4-Way ridge tiles.
4. Hip starters.
5. Ridge ends.
6. Precut double eave tiles.
7. 90 degree rakes.
8. Under ridges.
9. Barrel bird stops.
10. Hurricane clips.
11. Prefabricated clay eave closures.
12. Preformed Copper Flashings.
13. Copper Edge Returns.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verification of Conditions:

1. Confirm work by others is installed per the project requirements. Do not cover work by others prior to inspection or acceptance.
2. Inspect seams, penetrations and details, identify defects in writing to the Architect.

3. Do not install over wet surfaces.

B. Do not proceed until unacceptable conditions are corrected.

3.2 PREPARATION

A. Clean and prepare substructure in accordance with manufacturer's instructions.

B. Protect underlayment during tile loading and stacking process. Immediately repair with like materials.

3.3 INSTALLATION

A. Install underlayment in accordance with the manufacturer's instructions.

B. Install flashing in accordance with FRSA/TRI Model Tile Guidelines and adjacent material manufacturers.

1. Where pan flashing is used, provide of sufficient size to direct water back onto the roof tiles.
2. Seal around pipes, vents, and other penetrations utilizing manufacturer's recommended accessories and details.

C. Install clay perimeter and field tiles, components, and accessories in accordance with Roofing Application Standard RAS-120.

D. Unless otherwise indicated on engineered shop drawings, provide minimum tile head lap of 3 inches (76.2 mm).

E. Ensure proper ventilation is provided in the final installation.

3.4 PROTECTION

A. Clean and protect tiles in accordance with the manufacturer's instructions for the duration of the construction period.

END OF SECTION

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BARREL CLAY TILE SPECIFICATIONS

Construction Document Set

A-15

H&C® COLORTOP™ SOLVENT-BASED SOLID COLOR CONCRETE SEALER

PRODUCT DESCRIPTION

H&C® COLORTOP™ Solvent-Based Solid Color Concrete Sealer is a solid color sealer designed to add deep penetrating protection and long-lasting beauty to exterior concrete. Available in a variety of pre-packaged and tintable colors. For interior surfaces, use H&C COLORTOP Water-Based Solid Color Concrete Stain.

**** H&C COLORTOP Solvent-Based Solid Color Concrete Sealer is formerly known as H&C® Concrete Sealer Solid Color Solvent-Based.***

FEATURES & BENEFITS

- Protects and beautifies exterior concrete and masonry.
- Bonds with the surface for long lasting protection.
- Has a low film build to maintain architechtural details
- Resists salt, acids, alkalis, water, ultraviolet light, oil, gasoline and hot tire marks.
- Packaged colors & tint bases
- No sealer required

RECOMMENDED USES

H&C COLORTOP Solvent-Based Solid Color Concrete Sealer is formulated for use on concrete and masonry exterior surfaces such as driveways, walkways, patios, athletic courts and more.

COVERAGE RATES

Substrate*	sq ft/gal
Concrete floors	200-250
Porous concrete	150-200
Concrete block	125-150
Split-faced block	100-125
Fluted block	75-100
Brick (clay)	100-150

*Coverage will vary depending on the porosity and texture of the substrate.

JOBSITE TEST SECTION

Due to the wide variety of substrates, preparation methods, application methods and environments, it is important to create a test sample.

LIMITATIONS

Do not use on asphalt or other areas sensitive to solvent attack.

Do not apply if rain is expected within 12 hours following application.

SURFACE PREPARATION

New Concrete: Allow new concrete to cure at least 28 days. Concrete surfaces should be able to absorb water. To test absorption, spray various sections of the surface to be stained with water. If the water does not absorb rapidly, then acid etch the surface using H&C® CONCRETEREADY® Etching Solution, following label instructions. After proper etching, the surface should feel like 120-grit sandpaper. If not, then etch again. Mechanical abrasion methods may be necessary to achieve proper profile. Do not apply the stain until all surfaces are porous. Allow all surfaces to dry at least 24 hours before staining. Prepared concrete must have a pH of 6 to 10.

Existing and Previously Painted Concrete: All concrete must be porous, clean, dry and free of grease, oil and other contaminants. To spot clean, use H&C CONCRETEREADY Cleaner Degreaser, following label directions. If mold, mildew, or fungus is present, kill and remove with a solution of 1 cup household bleach to 1 gallon of water. For best performance on previously painted surfaces apply H&C® Acryla-Deck® according to product instructions. Rinse away sanding dust before stain application.* DO NOT ETCH PREVIOUSLY PAINTED SURFACES. For garage floors, apply H&C® SHIELD-CRETE® Water-Based Epoxy Garage Floor Coating. On driveways, use H&C® Heavy Shield™ Water-Based Solid Color Concrete and Driveway Enamel/Stain.

***WARNING:** Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. To avoid exposure to lead dust, wear proper protective equipment, such as a properly fitted respirator (NIOSH approved) and follow proper containment and cleanup procedures. For more information, call the National Lead Information Center at 1-800-424-LEAD (in U.S.) or contact your local health authority.

Repair: For the best repair on vertical and horizontal concrete and masonry surfaces, use H&C CONCRETEREADY Quick Patch and Repair to fill low spots and spalled concrete. Pleasenote that patching compounds will generally be visible through clear coatings.

TOOLS REQUIRED

- Synthetic bristle paint brush
- Synthetic roller cover (3/8 to 1/2-inch nap)
- Airless sprayer 2000 psi; tip .015 to .017 inch
- Eye Protection
- Respiratory Protection
- Gloves

NOTE: Back rolling is recommended after spraying.

APPLICATION INSTRUCTIONS

Apply H&C COLORTOP Solvent-Based Solid Color Concrete Sealer onto itself or bare, properly prepared, dry concrete surfaces only. Air, surface and material temperatures must be between 50° and 90° F and at least 5° F above the dew point during and for 24 hours after application. Do not apply H&C COLORTOP Solvent-Based Solid Color Concrete Sealer if rain is expected within 12 hours following application.

How to Apply: Apply with a brush, roller, or sprayer. Stir product thoroughly before and during application. When using more than one container, intermix all containers together to ensure color uniformity. Prior to applying the first coat, dry sweep the concrete with a stiff broom or shop vacuum to remove all loose surface contaminants.

First Coat: Apply first coat evenly, working in one direction. Allow to dry at least 4 hours before applying the second coat. Do not overwork the product. Brushing or back rolling over partially dried material may cause lifting of the coating from the surface.

Second Coat: For best coverage, apply the second coat perpendicular to the first coat. Two coats of H&C COLORTOP Solvent-Based Solid Color Concrete Sealer are usually sufficient.

SLIP RESISTANCE

Some surfaces such as inclined driveways, garages, steps and patios may require a slip-resistant additive for safety. Add H&C® SHARKGRIP® Slip-Resistant Additive to the final coat, following label directions. This product should not be used in place of a nonskid finish.

OTHER USES AND SYSTEMS

For a complete water-repellent system on vertical porous masonry surfaces, apply one flood coat of H&C® HYDRO-DEFEND® Super V® , then two coats of H&C COLORTOP Solvent-Based Solid Color Concrete Sealer. Lightweight split-faced block may require a film-forming product due to its extreme porosity.

CLEANUP

Clean tools with H&C ™ D-100 solvent, xylene or toluene. Follow solvent manufacturer's safety instructions. Use waterless hand cleaner to remove dried material from skin.

DISPOSAL

Follow your state or local regulations for disposal methods.

MAINTENANCE

Surfaces treated with H&C COLORTOP Solvent-Based Solid Color Concrete Sealer are easily cleaned using 3 parts water to 1 part H&C CONCRETEREADY Cleaner Degreaser.

PHYSICAL PROPERTIES

Typical Physical Properties and Characteristics

Property	Test Method	Value
Dry Time (@ 77°F, 50% RH)	Dry-to-touch	15 minutes
	Light traffic and Recoat	4 hours
	Heavy traffic	72-96 hours
	Full cure	7-14 days
Flash Point	ASTM D93, PMCC	80°F
VOC	EPA Method 24	542 g/L; 4.52 lb/gal*
Static Coefficient of Friction	ANSI/NFSI B1011-2007	0.6
Water-Vapor Transmission	ASTM D1653, Method A	0.6 grains/sq ft/hr 10.8 grams/sq m/24 hrs
Perm Rating	ASTM D1653	6.8 grains/(hr ft² in Hg)
Water Repellency on Masonry	SS-W-110C, weight gain	0.1% on mortar cube 0.0% on concrete brick 0.0% on clay brick
Weatherometer	G23 F Type, 2000 hours	No failure
Wind-Driven Rain	TT-P-555B	No visible water leaks 0.0 oz. weight gain
Chemical Resistance (SA)		
Alkali	2% NaOH 5% Tide 2% Ivory Flakes	Slight dulling No effect No effect
Acid	5% Citric Acid 100% Milk 5% Hydrochloric Acid 5% Phosphoric Acid Mustard Ketchup	No effect Slight discoloring Slight discoloring No effect Slight stain No effect
Reflectivity (white base only)	ASTM C1549	81.5%
Sheen (Pigmented)	ASTM D523	Satin
Sheen (Clear)		Gloss
Volume Solids Solids by Weight Solids by Volume	ASTM D2832	56% ± 2%* 34% ± 2%*
Weight per Gallon	ASTM D1475	9.85 lbs. ± 2%*

**May vary depending on color*

Custom Tinting	Tint Load
Extra White Base 1's	0-3 oz
Deep Base 1's	3-6 oz

ORDERING INFORMATION

Clear	Part Number/SMIS
1 gallon	10.000004-16/1071547
5 gallons	10.000005-20/1072651

Extra White	Part Number/SMIS
1 gallon	10.114014-16/6507-11997
5 gallons	10.114015-20/6507-11427

Deep Base	Part Number/SMIS
1 gallon	10.106014-16/6507-11435
5 gallons	10.106015-20/6507-11443

Bombay	Part Number/SMIS
1 gallon	10.100054-16/6507-11211
5 gallons	10.100055-20/6507-11229

Sandstone	Part Number/SMIS
1 gallon	10.100124-16/6507-11336
5 gallons	10.100125-20/6507-11344

Autumn Brown	Part Number/SMIS
1 gallon	10.100034-16/6507-11195
5 gallons	10.100035-20/6507-11203

Tile Red	Part Number/SMIS
1 gallon	10.100164-16/6507-11393
5 gallons	10.100165-20/6507-11401

Terracotta	Part Number/SMIS
1 gallon	10.100154-16/6507-11377
5 gallons	10.100155-20/6507-11385

Patio Green	Part Number/SMIS
1 gallon	10.100104-16/6507-11294
5 gallons	10.100105-20/6507-11302

Pearl Gray	Part Number/SMIS
1 gallon	10.100114-16/6507-11310
5 gallons	10.100115-20/6507-11328

Gull Gray	Part Number/SMIS
1 gallon	10.100084-16/6507-11278
5 gallons	10.100085-20/6507-11286

Silver Gray	Part Number/SMIS
1 gallon	10.100144-16/6507-11351
5 gallons	10.100145-20/6507-11369

Black	Part Number/SMIS
1 gallon	10.100024-16/6507-11179
5 gallons	10.100025-20/6507-11187

Charcoal	Part Number/SMIS
1 gallon	10.100074-16/6507-11252
5 gallons	10.100075-20/6507-11260

CAUTION

CAUTIONS: CONTAINS XYLENE. Contents are **FLAMMABLE**. Vapors may cause flash fires. Keep away from heat, sparks and open flame. During use and until all vapors are gone: Keep area ventilated - Do not smoke - Extinguish all flames, pilot lights, and heaters - Turn off stoves, electric tools and appliances, and any other sources of ignition. **VAPOR HARMFUL**. Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage. **FIRST AID**: In case of eye contact, flush thoroughly with large amounts of water for 15 minutes and get medical attention. For skin contact, wash thoroughly with soap and water. In case of respiratory difficulty, provide fresh air and call physician. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately. **DELAYED EFFECTS FROM LONG-TERM OVEREXPOSURE**. Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling the contents can be harmful or fatal. **WARNING**: This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. **DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN.**

LIMITED WARRANTY

Seller's and manufacturer's only obligations shall be to replace such quantity of product proved to be defective. Neither seller nor manufacturer shall be liable for any injury, loss or damage, direct or consequential, arising from the applicator's inability to use the product for his/her intended use. The user assumes all risk and liability.

TECHNICAL SERVICES

The information and recommendations set forth in this product data sheet are based on tests conducted by or on behalf of H&C Products Group and The Sherwin-Williams® Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your H&C or Sherwin-Williams representative to obtain the most recent product data sheet.

For technical assistance, call 1-800-867-8246 or visit www.hcconcrete.com.

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TOWN OF LAKE PARK WELCOME

Historical Resources

Town Hall Structural Roof Replacement & Exterior Restoration

535 Park Avenue, Lake Park, FL 33403

NO.	DATE	DESCRIPTION

DATE:	04.10.2023
MODELED:	Author
CHECKED:	Checker
REG PROJECT #:	22029

PAINT SPECIFICATIONS COLORTOP

Construction Document Set

A-16

SHERWIN WILLIAMS.

As of 11/06/2018, Complies with:			
OTC	Yes	LEED® 09CI	N/A
OTC Phase II	Yes	LEED® 09NC	N/A
SCAQMD	Yes	LEED® 09CS	N/A
CARB	Yes	LEED® v4 Emissions	N/A
CARB SCM2007	Yes	LEED® v4 VOC	Yes
Canada	Yes	MPI	

LOXON®

SELF-CLEANING ACRYLIC SATIN

LX14W0051 Extra White
LX14W0053 Deep Base
LX14T0054 Ultradeep Base
LX14Y0056 Light Yellow

CHARACTERISTICS

Loxon® Self-Cleaning Acrylic Coating is specifically engineered for exterior, above-grade, masonry surfaces requiring a clean and attractive look while providing high performance protection with enhanced water shedding and dirt pick-up resistant properties. This may be applied to a surface with a pH of 6 to 13.

Loxon Self-Cleaning Acrylic Coating is formulated to be self-cleaning by shedding dirt upon rain or water contact.

Key Attributes and Benefits:

- Excellent dirt pick up resistance
- Excellent water shedding
- Resistant to wind driven rain
- Hydrophobic characteristics
- Adhesion to multiple concrete surfaces, wood and EIFS
- Highly alkali and efflorescence resistant
- Apply directly to fresh concrete (at least 7 days old)
- Can be applied down to 35°F

Color: Many colors
Coverage: 220-320 sq ft/gal
@ 5-7 mils wet; 2.0-2.8 mils dry
Coverage on porous & rough stucco 125 square feet per gallon
Drying Time, @ 77°F, 50% RH:
Touch: 4 hours
Recoat: 24 hours
No maximum recoat time. Drying and recoat times are temperature, humidity, and film thickness dependent.
Finish: 10-20 units @ 60°
Tinting with CCE:

Base	oz/gal	Strength
Extra White	0-7	SherColor
Deep Base	4-12	SherColor
Ultradeep Base	10-12	SherColor
Light Yellow	0-12	SherColor

Extra White **LX14W0051**
(may vary by base)

VOC (less exempt solvents):
<50 g/L; <0.42 lb/gal As per 40 CFR 59.406
Volume Solids: 40 ± 2%
Weight Solids: 50 ± 2%
Weight per Gallon: 10.18 lb
Flash Point: N/A
Vehicle Type: 100% Acrylic
Shel Life: 36 months unopened

Mildew Resistant
This coating contains agents which inhibit the growth of mildew on the surface of this coating film.

APPLICATION

Apply at temperatures above 35°F. When the air temperature is at 35°F, substrates may be colder; prior to painting, check to be sure the air, surface, and material temperature are above 35°F and at least 5°F above the dew point. Avoid using if rain or snow is expected within 2-3 hours.
Do not apply at air or surface temperatures below 35°F or when air or surface temperatures may drop below 35°F within 48 hours.

No reduction necessary.
Do not paint in direct sun or on a hot surface.

Brush - Use a nylon/polyester brush. Purdy Pro-Extra
Roller - Use a 1/2"-3/4" nap synthetic cover. Purdy Marathon
Spray—Airless
Pressure ..... 2000 psi
Tip ..... .017-.021"
Spray and backroll on porous & rough stucco to achieve required film build and a pin-hole free surface.

TIPS

Sealing and Patching—After cleaning the surface thoroughly, prime the concrete surface with Loxon Self-Cleaning Acrylic Coating , apply an elastomeric patch or sealant if needed, allow to dry, then topcoat.
To improve the performance consider:

- Use caution when preparing the substrate to create a uniform surface.
- Cracks, crevices, and through-wall openings must be patched with an elastomeric patch or sealant.
- Fill voids and openings around window and doors with an elastomeric patch or sealant.
- Stripe coat all inside and outside corners and edges with 1 coat of Loxon Self-Cleaning Acrylic Coating .

SPECIFICATIONS

Concrete, Masonry, Stucco
Self-prime using 2cts. of Loxon Self-Cleaning
Or
1ct. Loxon Concrete & Masonry Primer
2cts. Loxon Self-Cleaning Acrylic Coating

CMU, Block, Split-face Block
1ct. Loxon Acrylic Block Surfacer
Or Pro Industrial Heavy Duty Block Filler
2 cts. Loxon Self-Cleaning Acrylic Coating

Spray and backroll on porous & rough stucco to achieve required film build and a pin-hole free surface.

For porous block a coat of Loxon Acrylic Block Surfacer is required to achieve a pinhole free surface.

PHYSICAL PROPERTIES

LX14W0051

Wind-Driven Rain Test ..... Passes
Based on ASTM D6904-03
2cts Loxon Self-Cleaning Acrylic Coating at 4.2 mils dft
Water Vapor Permeance
Based on ASTM D1653 ..... 26.1 perms
Based on ASTM E96 ..... 23.4 perms
1 ct Loxon Self-Cleaning Acrylic Coating at 4.3 mils dft,14 day cure @ 77°F & 50% RH
Elongation 159%
ASTM D2370
1 ct Loxon Self-Cleaning Acrylic Coating at 4.8 mils dft,
14 day cure @ 77°F & 50% RH
Tensile Strength ..... 224 psi
ASTM D2370
1 ct Loxon Self-Cleaning Acrylic Coating at 4.8 mils dft,
14 day cure @ 77°F & 50% RH
Flexibility ..... Passes
ASTM D522- Method B, 180° bend,
1/8" mandrel
Alkali Resistance ..... Passes
Based on ASTM D1308
Mildew Resistance ..... Passes
ASTM D3273/D3274
Efflorescence 10
ASTM D7072-04

LOXON®
SELF-CLEANING ACRYLIC SATIN

SURFACE PREPARATION

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as a properly fitted respirator (**NIOSH** approved) and proper containment and cleanup. For more information, call the National Lead Information Center at **1-800-424-LEAD** (in US) or contact your local health authority.

Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Scrape and sand peeled or checked paint to a sound surface. Sand glossy surfaces dull. Seal stains from water, smoke, ink, pencil, grease, etc. with the appropriate primer/sealer. Recognize that any surface preparation short of total removal of the old coating may compromise the service length of the system.

Caulking
Gaps between windows, doors, trim, and other through-wall openings can be filled with the appropriate caulk after priming the surface.

Cement Composition Siding/Panels
Remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. Concrete and masonry must be cured at least 7 days at 75°F. Fill bugholes, air pockets, cracks, and other voids with an elastomeric patch or sealant. Rough surfaces can be filled to provide a smooth surface.

Incidental Metal
Wash to remove any oil, grease, or other surface contamination. All corrosion must be removed with sandpaper, wire brush, or other abrading method. Primer required.

SURFACE PREPARATION

Masonry, Concrete, CMU
Remove all dirt, dust, mildew, loose particles, laitance, foreign material, peeling and defective coatings, chalk, form release agents, moisture curing membranes, etc.
On tilt-up and poured-in-place concrete, commercial detergents and sandblasting may be necessary to remove sealers, release compounds, and to provide an anchor pattern.
Allow the surface to dry thoroughly.
Concrete and mortar must be cured at least 7 days at 75°F to apply this product directly. Fill bugholes, air pockets, cracks, and other voids with an elastomeric patch or sealant. Rough and porous block can be filled using Loxon Acrylic Block Surfacer to provide a smooth surface.

Mildew
Prior to attempting to remove mildew, it is always recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions may be advised.
Mildew may be removed before painting by washing with a solution of 1 part liquid bleach and 3 parts water. Apply the solution and scrub the mildewed area. Allow the solution to remain on the surface for 10 minutes. Rinse thoroughly with water and allow the surface to dry before painting. Wear protective eyewear, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.

Wood
Sand any exposed wood to a fresh surface. Patch all holes and imperfections with a wood filler or putty and sand smooth. All patched areas must be primed. Primer required.

CAUTIONS

For exterior use only.
Protect from freezing.
Non-photochemically reactive.
Not for use on horizontal surfaces (floors, roofs, decks, etc.) where water will collect.
Not for use below grade. Will not withstand hydrostatic pressure.

Before using, carefully read **CAUTIONS** on label.

ZINC. Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (**NIOSH** approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage. **FIRST AID:** In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately. **WARNING:** This product contains chemicals known to the State of California to cause cancer and birth defects or other reproductive harm. **DO NOT TAKE INTERNALLY. KEEP OUT OF THE REACH OF CHILDREN.**

HOTW 11/06/2018 LX14W0051 03 34
FRC,SP,KOR

CLEANUP INFORMATION

Clean spills, spatters, hands and tools immediately after use with soap and warm water. After cleaning, flush spray equipment with a compliant cleanup solvent to prevent rusting of the equipment. Follow manufacturer's safety recommendations when using solvents.

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PAINT SPECIFICATIONS SHERWIN WILLIAMS

Construction Document Set

A-16b

SECTION 09 9113
EXTERIOR PAINTS AND COATINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

A. Exterior paint and coating systems including surface preparation.

1.2 REFERENCES

A. Steel Structures Painting Council (SSPC):
1. SSPC-SP 1 - Solvent Cleaning.
2. SSPC-SP 2 - Hand Tool Cleaning.
3. SSPC-SP 3 - Power Tool Cleaning.
4. SSPC-SP5/NACE No. 1, White Metal Blast Cleaning.
5. SSPC-SP6/NACE No. 3, Commercial Blast Cleaning.
6. SSPC-SP7/NACE No. 4, Brush-Off Blast Cleaning.
7. SSPC-SP10/NACE No. 2, Near-White Blast Cleaning.
8. SSPC-SP11, Power Tool Cleaning to Bare Metal.
9. SSPC-SP12/NACE No. 5, Surface Preparation and Cleaning of Metals by Waterjetting Prior to Recoating.
10. SSPC-SP 13 / NACE No. 6 Surface Preparation for Concrete.

B. Material Safety Data Sheets / Environmental Data Sheets: Per manufacturer's MSDS/EDS for specific VOCs (calculated per 40 CFR 59.406). VOCs may vary by base and sheen.

C. California Department of Public Health (CDPH):
1. CDPH v1.1-2010 and V1.2-2017

1.3 SUBMITTALS

A. Submit under provisions of Section 01 30 00 - Administrative Requirements.

B. Product Data: For each paint system indicated, including.
1. Product characteristics.
2. Surface preparation instructions and recommendations.
3. Primer requirements and finish specification.
4. Storage and handling requirements and recommendations.
5. Application methods.
6. Cautions for storage, handling and installation.

C. Selection Samples: Submit a complete set of color chips that represent the full range of manufacturer's products, colors and sheens available.

D. Verification Samples: For each finish product specified, submit samples that represent actual product, color, and sheen.

E. Coating Maintenance Manual: Upon conclusion of project, the Contractor or paint manufacturer/supplier shall furnish a coating maintenance manual, such as Sherwin-

Williams, "Custodian Project Color and Product Information" report or equal. Manual shall include an Area Summary with finish schedule, Area Detail designating where each product/color/finish was used, product data pages, Material Safety Data Sheets, care and cleaning instructions, touch-up procedures, and color samples of each color and finish used. "

F. Only submit complying products based on project requirements (i.e. LEED). One must also comply with the regulations regarding VOCs (CARB, OTC, SCAQMD, LADCO). To ensure compliance with district regulations and other rules, businesses that perform coating activities should contact the local district in each area where the coating will be used.

G. USGBC LEED V4 Submittals:
1. MRc2 Environmental Product Declaration Product Language: Products shall be selected with a preference to products that have product-specific environmental product declaration documentation.
2. EQc2 Low Emitting Materials: The VOC content of all adhesives, sealants, paints and coatings in this Section shall not exceed the VOC limits established in Division 01 Sustainable Design sections.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A firm or individual experienced in applying paints and coatings similar in material, design, and extent to those indicated for this Project, whose work has resulted in applications with a record of successful in-service performance.

B. Paint exposed surfaces. If a color of finish, or a surface is not specifically mentioned, Architect will select from standard products, colors and sheens available.

C. Do not paint prefinished items, concealed surfaces, finished metal surfaces, operating parts, and labels unless indicated.

D. Mock-Up: Provide a mock-up for evaluation of surface preparation techniques and application workmanship.
1. Finish surfaces for verification of products, colors and sheens.
2. Finish area designated by Architect.
3. Provide samples that designate primer and finish coats.
4. Compatibility and Adhesion: Check after one week of drying and curing by testing in accordance with ASTM D3359; Adhesion by tape test. If coating system is incompatible, additional surface preparation up to and including complete removal may be required.
5. Do not proceed with remaining work until the Architect approves the mock-up.

1.5 DELIVERY, STORAGE, AND HANDLING

A. Delivery: Deliver manufacturer's unopened containers to the work site. Packaging shall bear the manufacturer's name, label, and the following list of information.
1. Product name, and type (description).
2. Application and use instructions.
3. Surface preparation.
4. VOC content.
5. Environmental handling.
6. Batch date.
7. Color number.

B. Storage: Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

C. Store materials in an area that is within the acceptable temperature range, per manufacturer's instructions. Protect from freezing.

D. Handling: Maintain a clean, dry storage area, to prevent contamination or damage to the coatings.

1.6 PROJECT CONDITIONS

A. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.

1.7 EXTRA MATERIALS

A. Furnish extra paint materials from the same production run as the materials applied and in the quantities described below. Package with protective covering for storage and identify with labels describing contents. Deliver extra materials to Owner.

B. Furnish Owner with an additional one percent of each material and color, but not less than 1 gal (3.8 l) or 1 case, as appropriate.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable Manufacturer: Sherwin-Williams, Glenn Remler, Architectural Account Executive, (954) 547-1217 , Glenn.J.Remler@Sherwin.com

B. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

2.2 APPLICATIONS/SCOPE

A. Exterior Paint and Coating Systems:
1. Concrete: Cementitious siding, flexboard, transite, and shingles; non-roof.
2. Concrete: Non-vehicular concrete floors, patios, porches, steps and platforms.
3. Metal: Aluminum, galvanized steel.
4. Vinyl: Siding, EIFS, synthetic stucco.

2.3 PAINT MATERIALS - GENERAL

A. Paints and Coatings:
1. Unless otherwise indicated, provide factory-mixed coatings. When required, mix coatings to correct consistency in accordance with manufacturer's instructions before application. Do not reduce, thin, or dilute coatings or add materials to coatings unless such procedure is specifically described in manufacturer's product instructions.
2. For opaque finishes, tint each coat including primer coat and intermediate coats, one-half shade lighter than succeeding coat, with final finish coat as base color. Or follow manufactures product instructions for optimal color conformance.

B. Primers: Where the manufacturer offers options on primers for a particular substrate, use primer categorized as "best" by the manufacturer.

C. Coating Application Accessories: Provide all primers, sealers, cleaning agents, cleaning cloths, sanding materials, and clean-up materials required, per manufacturer's specifications.

D. Color: Refer to Finish Schedule for paint colors, and as selected.

E. LEED Requirements: LEED V4 and V4.1 EQ Credit: Indoor Environmental Quality-Low Emitting Materials.

2.4 EXTERIOR PAINT AND COATING SYSTEMS

A. Concrete: Cementitious Siding, Flexboard, Transite Board, Non-Roof Shingles, Common Brick, Stucco, Tilt-up, Precast, and Poured-in-place Cement.
1. Latex Systems:
a. Satin Finish Self Cleaning Upgrade:
1) 1st Coat: S-W Loxon Self Cleaning Acrylic Coating-Satin, LX14-50 Series.
2) 2nd Coat: S-W Loxon Self Cleaning Acrylic Coating-Satin, LX14-50 Series (5.0-7.0 mils wet, 2.0-2.8 dry per coat).

B. Metal: Non-Vehicular Floors, Steps, Rails, and Platforms.
1. Urethane System Water-Based:
a. Floor Finish: (**Remove and Replace all coatings back down to substrate**)
1) 1st Coat: S-W Macropoxy 646-100, B58W620/B58V620 Series. (7.0-13.0 mils wet, 5.0-10.0 mils dry per coat)
2) 2nd Coat: S-W High-Solids Polyurethane B65W300/B60V30 Series (4.5-8.0 mils wet, 3.0-5.0 mils dry per coat).

C. Metal: Aluminum, Galvanized.
1. Alkyd Systems; Waterbased:
a. Gloss Finish:
1) 1st Coat: S-W Pro Industrial Pro-Cryl Universal Primer, B66-1310 Series (5.0 mils wet, 2.0 mils dry).
2) 2nd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Gloss, B53-1050 Series.
3) 3rd Coat: S-W Pro Industrial Waterbased Alkyd Urethane Enamel Gloss, B53-1050 Series (4.0-5.0 mils wet, 1.4 - 1.7 mils dry per coat).

D. Vinyl Siding EIFS, Synthetic Stucco:
1. Latex Systems:
a. Satin Finish Self Cleaning Upgrade:
1) 1st Coat: S-W Loxon Self Cleaning Acrylic Coating-Satin, LX14-50 Series.
2) 2nd Coat: S-W Loxon Self Cleaning Acrylic Coating-Satin, LX14-50 Series (5.0-7.0 mils wet, 2.0-2.8 dry per coat).

PART 3 EXECUTION

3.1 EXAMINATION

A. Do not begin installation until substrates have been properly prepared; notify Architect of unsatisfactory conditions before proceeding. If substrate preparation is the responsibility of another installer, notify Architect of unsatisfactory preparation before proceeding.

B. Proceed with work only after conditions have been corrected and approved by all parties, otherwise application of coatings will be considered as an acceptance of surface conditions.

C. Previously Painted Surfaces: Verify that existing painted surfaces do not contain lead based paints, notify Architect immediately if lead based paints are encountered.

3.2 SURFACE PREPARATION

A. General: Surfaces shall be dry and in sound condition. Remove oil, dust, dirt, loose rust,

peeling paint or other contamination to ensure good adhesion.
1. Prior to attempting to remove mildew, it is recommended to test any cleaner on a small, inconspicuous area prior to use. Bleach and bleaching type cleaners may damage or discolor existing paint films. Bleach alternative cleaning solutions are advised.
2. Remove mildew before painting by washing with a solution of 1 part liquid household bleach and 3 parts of warm water. Apply solution and scrub the mildewed area. Allow solution to remain on the surface for 10 minutes. Rinse thoroughly with clean water and allow surface to dry before painting. Wear protective glasses or goggles, waterproof gloves, and protective clothing. Quickly wash off any of the mixture that comes in contact with your skin. Do not add detergents or ammonia to the bleach/water solution.
3. Remove items including but not limited to thermostats, electrical outlets, switch covers and similar items prior to painting. After completing painting operations in each space or area, reinstall items removed using workers skilled in the trades involved.
4. No exterior painting should be done immediately after a rain, during foggy weather, when rain is predicted, or when the temperature is below 50 degrees F (10 degrees C), unless products are designed specifically for these conditions. On large expanses of metal siding, the air, surface and material temperatures must be 50 degrees F (10 degrees F) or higher to use low temperature products.

B. Aluminum: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP1, Solvent Cleaning.

C. Block (Cinder and Concrete): Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement, and hardeners. Concrete and mortar must be cured at least 30 days at 75 degrees F (24 degrees C). The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments. On tilt-up and poured-in-place concrete, commercial detergents and abrasive blasting may be necessary to prepare the surface. Fill bug holes, air pockets, and other voids with a cement patching compound.

D. Concrete, SSPC-SP13 or NACE 6: This standard gives requirements for surface preparation of concrete by mechanical, chemical, or thermal methods prior to the application of bonded protective coating or lining systems. The requirements of this standard are applicable to all types of cementitious surfaces including cast-in-place concrete floors and walls, precast slabs, masonry walls, and shotcrete surfaces. An acceptable prepared concrete surface should be free of contaminants, laitance, loosely adhering concrete, and dust, and should provide a sound, uniform substrate suitable for the application of protective coating or lining systems.

E. Cement Composition Siding/Panels: Remove all surface contamination by washing with an appropriate cleaner, rinse thoroughly and allow to dry. Existing peeled or checked paint should be scraped and sanded to a sound surface. Pressure clean, if needed, with a minimum of 2100 psi pressure to remove all dirt, dust, grease, oil, loose particles, laitance, foreign material, and peeling or defective coatings. Allow the surface to dry thoroughly. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments.

F. Copper and Stainless Steel: Remove all oil, grease, dirt, oxide and other foreign material by cleaning per SSPC-SP 2, Hand Tool Cleaning.

G. Exterior Composition Board (Hardboard): Some composition boards may exude a waxy material that must be removed with a solvent prior to coating. Whether factory primed or unprimed, exterior composition board siding (hardboard) must be cleaned thoroughly and primed with an alkyd primer.

H. Drywall - Exterior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting. Exterior surfaces must be spackled with exterior grade compounds.

I. Drywall - Interior: Must be clean and dry. All nail heads must be set and spackled. Joints must be taped and covered with a joint compound. Spackled nail heads and tape joints must be sanded smooth and all dust removed prior to painting.

J. Galvanized Metal: Clean per SSPC-SP1 using detergent and water or a degreasing cleaner to remove greases and oils. Apply a test area, priming as required. Allow the coating to dry at least one week before testing. If adhesion is poor, Brush Blast per SSPC-SP16 is necessary to remove these treatments.

K. Plaster: Must be allowed to dry thoroughly for at least 30 days before painting unless the products are designed to be used in high pH environments. Room must be ventilated while drying; in cold, damp weather, rooms must be heated. Damaged areas must be repaired with an appropriate patching material. Bare plaster must be cured and hard. Textured, soft, porous, or powdery plaster should be treated with a solution of 1 pint household vinegar to 1 gallon of water. Repeat until the surface is hard, rinse with clear water and allow to dry.

L. Steel: Structural, Plate, And Similar Items: Should be cleaned by one or more of the surface preparations described below. These methods are used throughout the world for describing methods for cleaning structural steel. Visual standards are available through the Society of Protective Coatings. A brief description of these standards together with numbers by which they can be specified follow.
1. Solvent Cleaning, SSPC-SP1: Solvent cleaning is a method for removing all visible oil, grease, soil, drawing and cutting compounds, and other soluble contaminants. Solvent cleaning does not remove rust or mill scale. Change rags and cleaning solution frequently so that deposits of oil and grease are not spread over additional areas in the cleaning process. Be sure to allow adequate ventilation.
2. Hand Tool Cleaning, SSPC-SP2: Hand Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before hand tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
3. Power Tool Cleaning, SSPC-SP3: Power Tool Cleaning removes all loose mill scale, loose rust, and other detrimental foreign matter. It is not intended that adherent mill scale, rust, and paint be removed by this process. Before power tool cleaning, remove visible oil, grease, soluble welding residues, and salts by the methods outlined in SSPC-SP1.
4. White Metal Blast Cleaning, SSPC-SP5 or NACE 1: A White Metal Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
5. Commercial Blast Cleaning, SSPC-SP6 or NACE 3: A Commercial Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 33 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
6. Brush-Off Blast Cleaning, SSPC-SP7 or NACE 4: A Brush-Off Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust,

loose mill scale, loose rust, and loose paint. Tightly adherent mill scale, rust, and paint may remain on the surface. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP 1 or other agreed upon methods.
7. Power Tool Cleaning to Bare Metal, SSPC-SP11: Metallic surfaces that are prepared according to this specification, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxide corrosion products, and other foreign matter. Slight residues of rust and paint may be left in the lower portions of pits if the original surface is pitted. Prior to power tool surface preparation, remove visible deposits of oil or grease by any of the methods specified in SSPC-SP1, Solvent Cleaning, or other agreed upon methods.
8. Near-White Blast Cleaning, SSPC-SP10 or NACE 2: A Near White Blast Cleaned surface, when viewed without magnification, shall be free of all visible oil, grease, dirt, dust, mill scale, rust, paint, oxides, corrosion products, and other foreign matter, except for staining. Staining shall be limited to no more than 5 percent of each square inch of surface area and may consist of light shadows, slight streaks, or minor discoloration caused by stains of rust, stains of mill scale, or stains of previously applied paint. Before blast cleaning, visible deposits of oil or grease shall be removed by any of the methods specified in SSPC-SP1 or other agreed upon methods.
9. High- and Ultra-High Pressure Water Jetting for Steel and Other Hard Materials: SSPC-SP12 or NACE 5: This standard provides requirements for the use of high- and ultra-high pressure water jetting to achieve various degrees of surface cleanliness. This standard is limited in scope to the use of water only without the addition of solid particles in the stream.
10. Water Blasting, SSPC-SP12/NACE No. 5: Removal of oil grease dirt, loose rust, loose mill scale, and loose paint by water at pressures of 2,000 to 2,500 psi at a flow of 4 to 14 gallons per minute.

M. Vinyl Siding, Architectural Plastics, EIFS and Fiberglass: Clean vinyl siding thoroughly by scrubbing with a warm, soapy water solution. Rinse thoroughly. Do not paint vinyl siding with any color darker than the original color unless the paint system features Sherwin-Williams VinylSafe technology. Painting with darker colors that are not Sherwin-Williams VinylSafe may cause siding to warp. Follow all painting guidelines of the vinyl manufacturer when painting. Only paint properly installed vinyl siding. Deviating from the manufacturer's painting guidelines may cause the warranty to be voided.

N. Stucco: Must be clean and free of any loose stucco. If recommended procedures for applying stucco are followed, and normal drying conditions prevail, the surface may be painted in 30 days. The pH of the surface should be between 6 and 9 unless the products are designed to be used in high pH environments such as Loxon.

O. Wood: Must be clean and dry. Prime and paint as soon as possible. Knots and pitch streaks must be scraped, sanded, and spot primed before a full priming coat is applied. Patch all nail holes and imperfections with a wood filler or putty and sand smooth.

3.3 INSTALLATION

A. Apply all coatings and materials with the manufacturer's specifications in mind. Mix and thin coatings according to manufacturer's recommendations.

B. Do not apply to wet or damp surfaces. Wait at least 30 days before applying to new concrete or masonry. Or follow manufacturer's procedures to apply appropriate coatings prior to 30 days. Test new concrete for moisture content. Wait until wood is fully dry after rain or morning fog or dew.

C. Apply coatings using methods recommended by manufacturer.

D. Uniformly apply coatings without runs, drips, or sags, without brush marks, and with consistent sheen.

E. Apply coatings at spreading rate required to achieve the manufacturers recommended dry film thickness.

F. Regardless of number of coats specified, apply as many coats as necessary for complete hide, and uniform appearance.

G. Inspection: The coated surface must be inspected and approved by the Architect just prior to the application of each coat.

3.4 PROTECTION

A. Protect finished coatings from damage until completion of project.

B. Touch-up damaged coatings after substantial completion, following manufacturer's recommendation for touch up or repair of damaged coatings. Repair any defects that will hinder the performance of the coatings.

END OF SECTION

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TOWN OF LAKE PARK WELCOME

Historical Resources

Town Hall Structural Roof Replacement & Exterior Restoration

535 Park Avenue, Lake Park, FL 33403

NO. DATE DESCRIPTION

DATE:	04.10.2023
MODELED:	Author
CHECKED:	Checker
REG PROJECT #:	22029

PAINT SPECIFICATIONS SHERWIN WILLIAMS

Construction Document Set

A-16c

BILCO Type S roof hatches, 36" x 30" (914mm x 762mm) are used to provide roof top access by means of a fixed interior ladder. The easy, one-hand operation, to the fully open or closed position, provides the user the security of having one hand firmly on the ladder at all times. Available in galvanized steel, aluminum or stainless steel construction. For more information, please visit our website www.BILCO.com or call 1-800-366-6530.

SECTION 077233

ROOF HATCHES

(BILCO TYPE S)

PART 1 - GENERAL

1.1 SUMMARY

A. Work Included: Provide factory-fabricated roof hatches for ladder access.

1.2 SUBMITTALS

A. Product Data: Submit manufacturer's product data.

B. Shop Drawings: Submit shop drawings including profiles, accessories, location, adjacent construction interface, and dimensions.

C. Warranty: Submit executed copy of manufacturer's standard warranty.

1.3 QUALITY ASSURANCE

A. Manufacturer: A minimum of 5 years experience manufacturing similar products.

B. Installer: A minimum of 2 years experience installing similar products.

C. Manufacturer's Quality System: Registered to ISO 9001 Quality Standards including in-house engineering for product design activities.

1.4 DELIVERY, STORAGE AND HANDLING

A. Deliver products in manufacturer's original packaging. Store materials in a dry, protected, well-vented area. Inspect product upon receipt and report damaged material immediately to delivering carrier and note such damage on the carrier's freight bill of lading.

1.5 WARRANTY

A. Manufacturer's Warranty: Provide manufacturer's standard warranty. Materials shall be free of defects in material and workmanship for a period of five years from the date of purchase. Should a part fail to function in normal use within this period, manufacturer shall furnish a new part at no charge.

PART 2 - PRODUCTS

2.1 MANUFACTURER

A. Basis-of-Design Manufacturer: Type S Roof Hatch by The BILCO Company, P.O. Box 1203, New Haven, CT 06505, 1-800-366-6530, Fax: 1-203-535-1582, Web: www.BILCO.com.

2.2 ROOF HATCH

A. Furnish and install where indicated on plans metal roof hatch Type S, size width: 36" (914mm) x length: 30" (762mm). Length denotes hinge side. The roof hatch shall be single leaf. The roof hatch shall be pre-assembled from the manufacturer.

B. Performance characteristics:

1. Cover shall be reinforced to support a minimum live load of 40 psf (195kg/m^2) with a maximum deflection of 1/150th of the span and a maximum design pressure of +/- 100 PSF (488 kg/m^2) with a design factor of 2 for galvanized steel (Type S-20) and aluminum (Type S-50) roof hatches or 20 psf (97 kg/m^2) for stainless steel (Type S-90) roof hatches or roof hatches with an aluminum cover and galvanized steel curb (Type S-40)].
2. Operation of the cover shall be smooth and easy with controlled operation throughout the entire arc of opening and closing.
3. Operation of the cover shall not be affected by temperature.
4. Entire hatch shall be weather tight with fully welded corner joints on cover and curb.
5. Galvanized steel (Type S-20) and aluminum (Type S-50) roof hatches shall have a valid Notice of Acceptance (NOA) by Miami-Dade County Product Control Section. The hatches shall have product approval (FL) by Florida Building Council regarding compliance to Florida Building Code.

C. Cover: Shall be [select: 14 gauge (1.9mm) paint bond G-90 galvanized steel or 11 gauge (2.3mm) aluminum] with a 3" (76mm) beaded flange with formed reinforcing members. Cover shall have a heavy extruded EPDM rubber gasket that is bonded to the cover interior to assure a continuous seal when compressed to the top surface of the curb.

D. Cover insulation: Shall be fiberglass of 1" (25mm) thickness, fully covered and protected by a metal liner [select: 22 gauge (.8mm) paint bond G-90 galvanized steel or 18 gauge (1mm) aluminum].

E. Curb: Shall be 12" (305mm) in height and of [select: 14 gauge (1.9mm) paint bond G-90 galvanized steel or 11 gauge (2.3mm) aluminum]. The curb shall be formed with a 3-1/2" (89mm) flange with 7/16" (11.1mm) holes provided for securing to the roof deck. The curb shall be equipped with an integral metal capflashing of the same gauge and material as the curb, fully welded at the corners, that features the Bil-Clip® flashing system, including stamped tabs, 6" (153mm) on center, to be bent inward to hold single ply roofing membrane securely in place.

F. Curb insulation: Shall be rigid, high-density fiberboard of 1" (25mm) thickness on outside of curb.

G. Lifting mechanisms: Manufacturer shall provide compression spring operators enclosed in telescopic tubes to provide, smooth, easy, and controlled cover operation throughout the entire arc of opening and closing. The upper tube shall be the outer tube to prevent accumulation of moisture, grit, and debris inside the lower tube assembly. The lower tube shall interlock with a flanged support shoe [for aluminum construction: welded to the curb assembly; for steel construction: through bolted to the curb assembly].

H. Hardware

1. Heavy pintle hinges shall be provided
2. Cover shall be equipped with a spring latch with interior and exterior turn handles
3. Roof hatch shall be equipped with interior and exterior padlock hasps.
4. The latch strike shall be a stamped component bolted to the curb assembly.
5. Cover shall automatically lock in the open position with a rigid hold open arm equipped with a 1" (25mm) diameter red vinyl grip handle to permit easy release for closing.
6. All hardware shall be zinc plated and chromate sealed. [For installation in highly corrosive environments or when prolonged exposure to hot water or steam is anticipated, specify Type 316 stainless steel hardware].
7. Cover hardware shall be bolted into heavy gauge channel reinforcing welded to the underside of the cover and concealed within the insulation space.

I. Finishes: Factory finish shall be [select: alkyd based red oxide primed steel or mill finish aluminum].

PART 3 - EXECUTION

3.1 EXAMINATION

A. Examine substrates and openings for compliance with requirements for installation tolerances and other conditions affecting performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 INSTALLATION

A. Install products in strict accordance with manufacturer's instructions and approved submittals. Locate units level, plumb, and in proper alignment with adjacent work.

1. Test units for proper function and adjust until proper operation is achieved.
2. Repair finishes damaged during installation.
3. Restore finishes so no evidence remains of corrective work.

3.3 ADJUSTING AND CLEANING

A. Clean exposed surfaces using methods acceptable to the manufacturer which will not damage finish.

END OF SECTION

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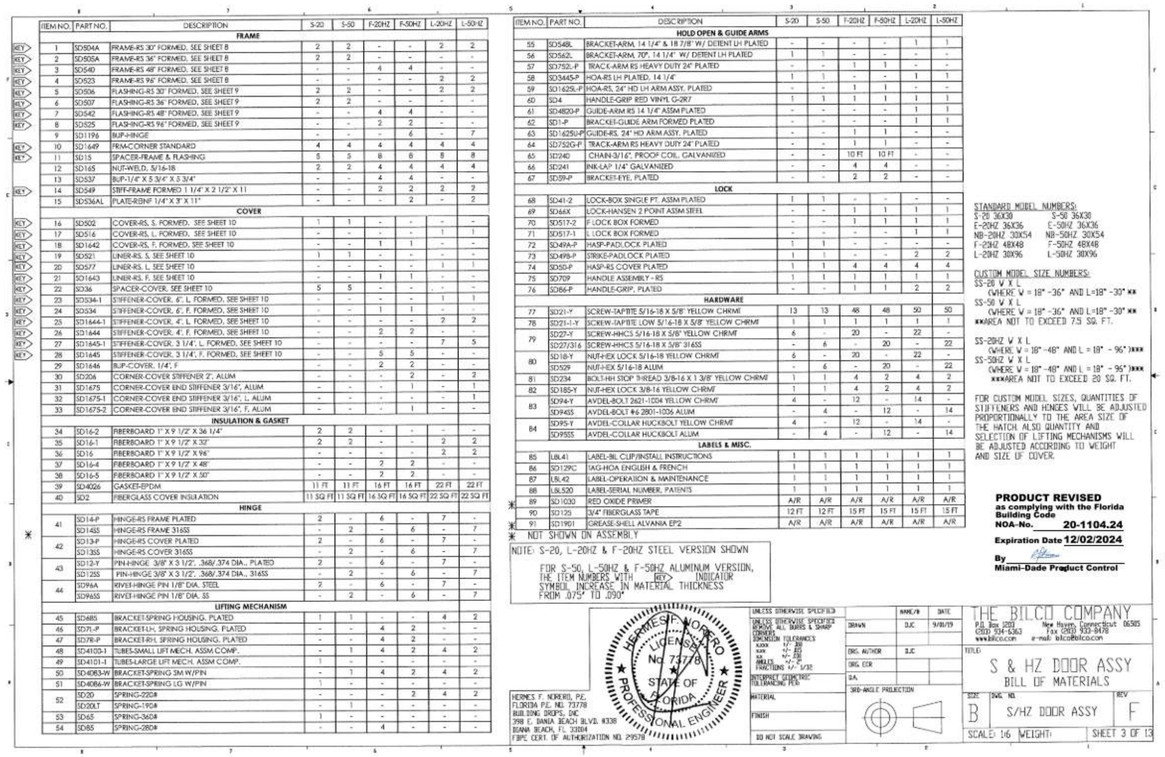
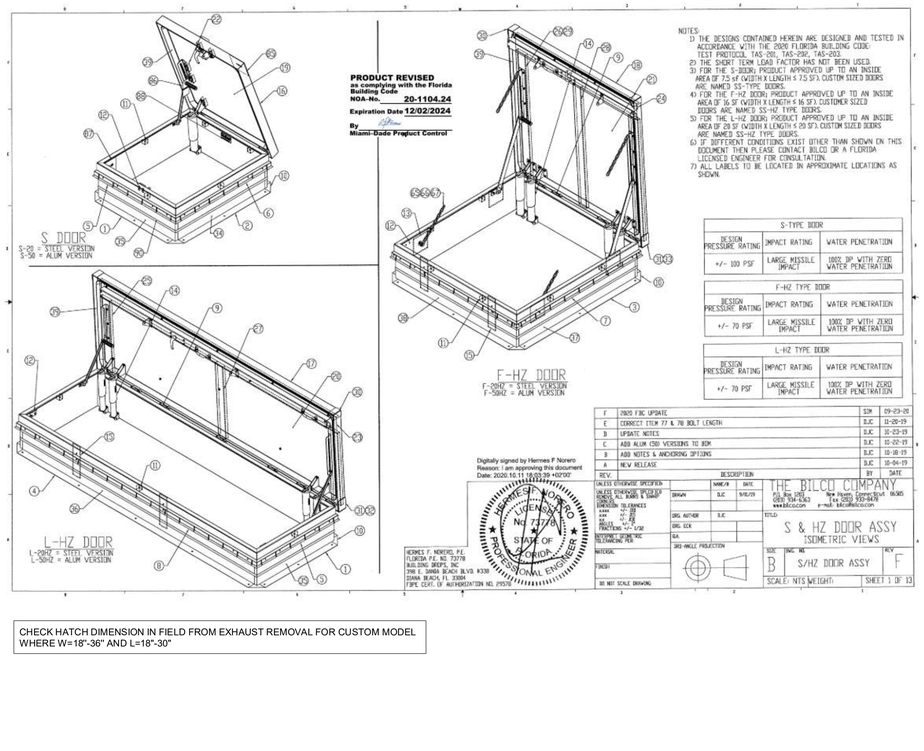
REG PROJECT #:	22029

ROOF HATCH SPECIFICATIONS

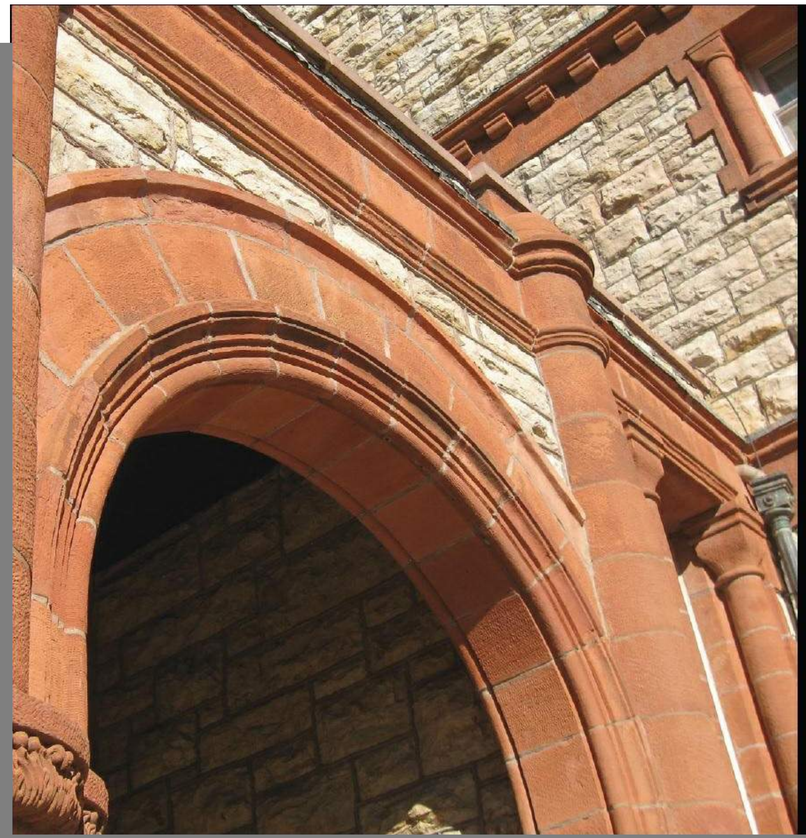
Construction Document Set

A-17





CHECK HATCH DIMENSION IN FIELD FROM EXHAUST REMOVAL FOR CUSTOM MODEL WHERE W=18"-36" AND L=18"-30"



THE SECRETARY OF THE INTERIOR'S **STANDARDS** FOR THE TREATMENT OF HISTORIC PROPERTIES WITH **GUIDELINES** FOR PRESERVING, REHABILITATING, RESTORING & RECONSTRUCTING HISTORIC BUILDINGS

U.S. Department of the Interior
National Park Service
Technical Preservation Services

SHOWN ABOVE IS THE COVER OF "STANDARDS AND GUIDELINES". SEE RESOURCES BELOW TO DOWNLOAD A COPY.

HIGHLIGHTED ABOVE IS THE SPECIFIC SECTIONS OF "STANDARDS AND GUIDELINES" THAT APPLY TO THIS PROJECT. THERE ARE OTHER SECTIONS THAT APPLY TO ALL TYPES OF PROJECTS AND THEY SHALL BE FOLLOWED AS WELL.

HISTORIC PRESERVATION RESOURCES:	Hyperlink (Available on PDF file):
The Secretary of the Interior's Standards for the Treatment of Historic Properties with Guidelines for Preserving, Rehabilitating, Restoring and Reconstructing Historic Buildings:	https://www.nps.gov/tps/standards/treatment-guidelines-2017.htm
Preservation Brief #4 - Roofing for Historic Buildings:	https://www.nps.gov/tps/how-to-preserve/briefs/4-roofing.htm
Preservation Brief #6 - Dangers of Abrasive Cleaning to Historic Buildings:	https://www.nps.gov/tps/how-to-preserve/briefs/6-dangers-abrasive-cleaning.htm
Preservation Brief #21 - Repairing Historic Flat Plaster Walls and Ceilings:	https://www.nps.gov/tps/how-to-preserve/briefs/21-flat-plaster.htm
Preservation Brief #35 - Understanding Old Buildings: The Process of Architectural Investigation:	https://www.nps.gov/tps/how-to-preserve/briefs/35-architectural-investigation.htm
Preservation Brief #37 - Appropriate Methods for Reducing Lead-Paint Hazards in Historic Housing:	https://www.nps.gov/tps/how-to-preserve/briefs/37-lead-paint-hazards.htm
Preservation Brief #39 - Holding the Line: Controlling Unwanted Moisture in Historic Buildings:	https://www.nps.gov/tps/how-to-preserve/briefs/39-control-unwanted-moisture.htm
Preservation Brief #42 - Maintenance, Repair and Replacement of Historic Cast Stone:	https://www.nps.gov/tps/how-to-preserve/briefs/42-cast-stone.htm
Preservation Brief #43 - The Preparation and Use of Historic Structure Reports:	https://www.nps.gov/tps/how-to-preserve/briefs/43-historic-structure-reports.htm

RE-ROOF DESCRIPTION OF WORK STABILIZATION PHASE

STABILIZATION PHASE SCOPE OF WORK INCLUDES DRY-ING OF BUILDING BY COMPLETE REMOVAL OF THE EXISTING ROOF SYSTEMS OF THE BUILDING. THIS IS A MULTI-STEP PROJECT THAT WILL NEED TO BE COMPLETED IN SECTIONS TO PREVENT ENTRY OF RAINWATER AND PESTS. IT INCLUDES THE FOLLOWING:

1. INITIAL ASSESSMENT AND RE-ROOF PLAN THAT INCLUDES REQUIRED ENVIRONMENTAL REMEDIATION.
2. REMOVAL OF ROOFING MATERIAL AND ACCESSORIES.
3. ONGOING EVALUATION OF ROOFING SUBSTRATE FOR REPAIRS OR REPLACEMENT.
4. IF SUBSTRATE MATERIAL SUCH AS STRUCTURAL WOOD DECKING IN THE BUILDING NEEDS REPLACEMENT IT WILL BE REPLACE TO MATCH HISTORIC MATERIAL AND SIMILAR IN SIZE AND SHAPE WITH CONSULTATION OF STRUCTURAL ENGINEER.
5. FURTHER EVALUATION OF SUPPORTING STRUCTURE WILL BE CONDUCTED AND ANY REPAIRS WILL NEED TO BE COMPLETED WITH CONSULTATION OF STRUCTURAL ENGINEER.
6. ENVIRONMENTAL REMEDIATION WILL OCCUR AS REQUIRED.
7. REPLACEMENT OR REPAIR OF ROOFING ACCESSORIES TO MATCH EXISTING IN APPEARANCE AND MATERIALS.
8. EXISTING ROOF CPR's ARE TO REMAIN AND MAY REQUIRE REPAIR.
9. ALL WORK SHALL COMPLY WITH THE SECRETARY OF INTERIOR'S STANDARDS FOR REHABILITATION & GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS (REVISED FOR 2017).

PHOTOGRAPHIC DOCUMENTATION REQUIRED

PHOTOGRAPHIC DOCUMENTATION REQUIRED BEFORE AND AFTER ALL PHASES OF DEMOLITION AND NEW WORK - NO EXCEPTIONS:

1. RESPONSIBILITY OF THE GENERAL CONTRACTOR.
2. SEE SHPO GRANT CONTRACT FOR REQUIREMENTS.
3. ELECTRONIC HIGH RESOLUTION JPEG FILES OF MINIMUM 2400 X 3000 PIXEL (8" X 10") SIZE EACH PHOTO.
4. SUBMIT AS REQUIRED BY SHPO AND PROVIDE COPY TO ARCHITECT VIA USB FLASH MEMORY STORAGE DEVICE OR MEMORY CARD.
5. ALL WORK SHALL COMPLY WITH THE SECRETARY OF INTERIOR'S STANDARDS FOR REHABILITATION & GUIDELINES FOR REHABILITATING HISTORIC BUILDINGS (REVISED FOR 2017).

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HISTORIC PRESERVATION STANDARDS & GUIDELINES

Construction Document Set

A-18

6 PRESERVATION BRIEFS

Dangers of Abrasive Cleaning to Historic Buildings

Anne E. Grimmer

U.S. Department of the Interior
National Park Service
Cultural Resources
Heritage Preservation Services

"The surface cleaning of structures shall be undertaken with the gentlest means possible. Sandblasting and other cleaning methods that will damage the historic building materials shall not be undertaken."—The Secretary of the Interior's "Standards for Historic Preservation Projects."

Abrasive cleaning methods are responsible for causing a great deal of damage to historic building materials. To prevent indiscriminate use of these potentially harmful techniques, this brief has been prepared to explain abrasive cleaning methods, how they can be physically and aesthetically destructive to historic building materials, and why they generally are not acceptable preservation treatments for historic structures. There are alternative, less harsh means of cleaning and removing paint and stains from historic buildings. However, careful testing should preceed general cleaning to assure that the method selected will not have an adverse effect on the building materials. A historic building is irreplaceable, and should be cleaned using only the "gentlest means possible" to best preserve it.

What is Abrasive Cleaning?

Abrasive cleaning methods include all techniques that physically abrade the building surface to remove soils, discolorations or coatings. Such techniques involve the use of certain *materials* which impact or abrade the surface under pressure, or abrasive *tools and equipment*. Sand, because it is readily available, is probably the most commonly used type of grit material. However, any of the following materials may be substituted for sand, and all can be classified as abrasive substances: ground slag or volcanic ash, crushed (pulverized) walnut or almond shells, rice husks, ground corncobs, ground coconut shells, crushed eggshells, silica flour, synthetic particles, glass beads and micro-balloons. Even *water* under pressure can be an abrasive substance. Tools and equipment that are abrasive to historic building materials include wire brushes, rotary wheels, power sanding disks and belt sanders.

The use of water in combination with grit may also be classified as an abrasive cleaning method. Depending on the manner in which it is applied, water *may* soften the impact of the grit, but water that is too highly pressurized can be very abrasive. There are basically two different methods which can be referred to as "wet grit," and it is important to differentiate between the two. One technique involves the addition of a stream of water to a regular sandblasting nozzle. This is done primarily to cut down dust, and has very little, if any, effect on reducing the aggressiveness, or cutting action of the grit particles. With the second technique, a very small amount of grit is added to a pressurized water stream. This method may be controlled by regulating the amount of grit fed into the water stream, as well as the pressure of the water.

Why Are Abrasive Cleaning Methods Used?

Usually, an abrasive cleaning method is selected as an expeditious means of quickly removing years of dirt accumulation, unsightly stains, or deteriorating building fabric or finishes, such as stucco or paint. The fact that sandblasting is one of the best known and most readily available building cleaning treatments is probably the major reason for its frequent use.

Many mid-19th century brick buildings were painted immediately or soon after completion to protect poor quality brick or to imitate another material, such as stone. Sometimes brick buildings were painted in an effort to produce what was considered a more harmonious relationship between a building and its natural surroundings. By the 1870s, brick buildings

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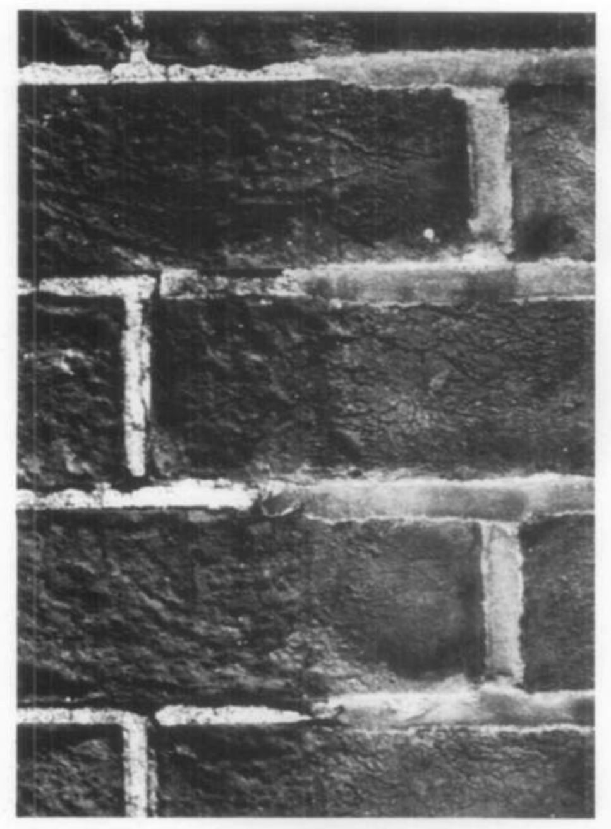
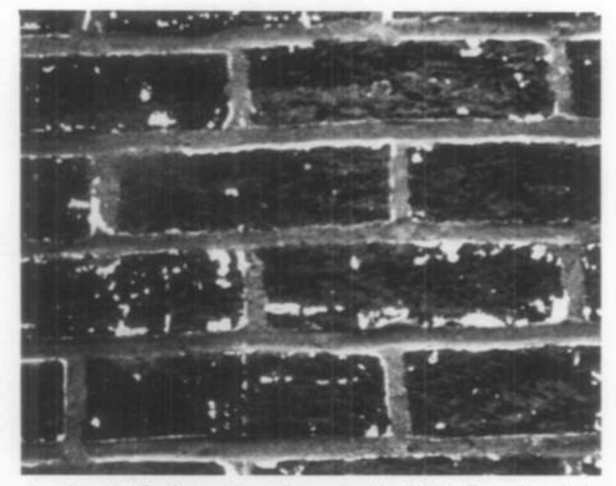


Abrasively Cleaned vs. Untouched Brick. *Two brick rowhouses with a common façade provide an excellent point of comparison when only one of the houses has been sandblasted. It is clear that abrasive blasting, by removing the outer surface, has left the brickwork on the left rough and pitted, while that on the right still exhibits an undamaged and relatively smooth surface. Note that the abrasive cleaning has also removed a considerable portion of the mortar from the joints of the brick on the left side, which will require repointing.*



Abrading the Surface without Removing the Paint. *Even though the entire outer surface layer of the brick has been sandblasted off, spots of paint still cling to the masonry. Sandblasting or other similarly abrasive methods are not always a successful means of removing paint.*

were often left unpainted as mechanization in the brick industry brought a cheaper pressed brick and fashion decreed a sudden preference for dark colors. However, it was still customary to paint brick of poorer quality for the additional protection the paint afforded.

It is a common 20th-century misconception that all historic masonry buildings were initially unpainted. If the intent of a modern restoration is to return a building to its original appearance, removal of the paint not only may be historically inaccurate, but also harmful. Many older buildings were painted or stuccoed at some point to correct recurring maintenance problems caused by faulty construction techniques, to hide alterations, or in an attempt to solve moisture problems. If this is the case, removal of paint or stucco may cause these problems to reoccur.

Another reason for paint removal, particularly in rehabilitation projects, is to give the building a "new image" in response to contemporary design trends and to attract investors or tenants. Thus, it is necessary to consider the purpose of the intended cleaning. While it is clearly important to remove unsightly stains, heavy encrustations of dirt, peeling paint or other surface coatings, it may not be equally desirable to remove paint from a building which originally was painted. Many historic buildings which show only a slight amount of soil or discoloration are much better left as they are. A thin layer of soil is more often protective of the building fabric than it is harmful, and seldom detracts from the building's architectural and/or historic character. Too thorough cleaning of a historic building may not only sacrifice some of the building's character, but also, misguided cleaning efforts can cause a great deal of damage to historic building fabric. Unless there are stains, graffiti or dirt and pollution deposits which are destroying the building fabric, it is generally preferable to do as little cleaning as possible, or to repaint where necessary. It is important to remember that a historic building does not have to look as if it were newly constructed to be an attractive or successful restoration or rehabilitation project. For a more thorough explanation of the philosophy of cleaning historic buildings see Preservation Briefs: No. 1 "The Cleaning and Waterproof Coating of Masonry Buildings," by Robert C. Mack, AIA.

Problems of Abrasive Cleaning

The crux of the problem is that abrasive cleaning is just that—abrasive. An abrasively cleaned historic structure may be physically as well as aesthetically damaged. Abrasive methods "clean" by eroding dirt or paint, but at the same time they also tend to erode the surface of the building material. In this way, abrasive cleaning is destructive and causes irreversible harm to the historic building fabric. If the fabric is brick, abrasive methods remove the hard, outer protective surface, and therefore make the brick more susceptible to rapid weathering and deterioration. Grit blasting may also increase the water permeability of a brick wall. The impact of the grit particles tends to erode the bond between the mortar and the brick, leaving cracks or enlarging existing cracks where water can enter. Some types of stone develop a protective patina or "quarry crust" parallel to the worked surface (created by the movement of moisture towards the outer edge), which also may be damaged by abrasive cleaning. The rate at which the material subsequently weathers depends on the quality of the inner surface that is exposed.

Abrasive cleaning can destroy, or substantially diminish, decorative detailing on buildings such as a molded brickwork or architectural terra-cotta, ornamental carving on wood or stone, and evidence of historic craft techniques, such as tool marks and other surface textures. In addition, perfectly sound and/or "tooled" mortar joints can be worn away by abrasive techniques. This not only results in the loss of historic craft detailing but also requires repointing, a step involving con-

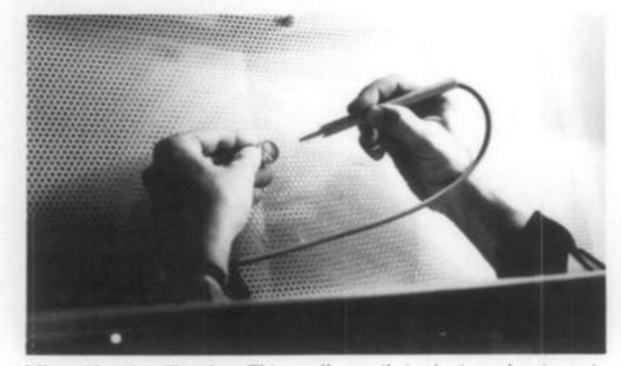
siderable time, skill and expense, and which might not have been necessary had a gentler method been chosen. Erosion and pitting of the building material by abrasive cleaning creates a greater surface area on which dirt and pollutants collect. In this sense, the building fabric "attracts" more dirt, and will require more frequent cleaning in the future.

In addition to causing physical and aesthetic harm to the historic fabric, there are several adverse environmental effects of dry abrasive cleaning methods. Because of the friction caused by the abrasive medium hitting the building fabric, these techniques usually create a considerable amount of dust, which is unhealthy, particularly to the operators of the abrasive equipment. It further pollutes the environment around the job site, and deposits dust on neighboring buildings, parked vehicles and nearby trees and shrubbery. Some adjacent materials not intended for abrasive treatment such as wood or glass, may also be damaged because the equipment may be difficult to regulate.

Wet grit methods, while eliminating dust, deposit a messy slurry on the ground or other objects surrounding the base of the building. In colder climates where there is the threat of frost, any wet cleaning process applied to historic masonry structures must be done in warm weather, allowing ample time for the wall to dry out thoroughly before cold weather sets in. Water which remains and freezes in cracks and openings of the masonry surface eventually may lead to spalling. High-pressure wet cleaning may force an inordinate amount of water into the walls, affecting interior materials such as plaster or joist ends, as well as metal building components within the walls.

Variable Factors

The greatest problem in developing practical guidelines for cleaning any historic building is the large number of variable and unpredictable factors involved. Because these variables make each cleaning project unique, it is difficult to establish specific standards at this time. This is particularly true of abrasive cleaning methods because their inherent potential for causing damage is multiplied by the following factors:
— the type and condition of the material being cleaned;
— the size and sharpness of the grit particles or the mechanical equipment;
— the pressure with which the abrasive grit or equipment is applied to the building surface;
— the skill and care of the operator; and
— the constancy of the pressure on all surfaces during the cleaning process.



Micro-Abrasive Cleaning. *This small, pencil-sized micro-abrasive unit is used by some museum conservators to clean small objects. This particular micro-abrasive unit is operated within the confines of a box (approximately 2 cubic feet of space), but a similar and slightly larger unit may be used for cleaning larger pieces of sculpture, or areas of architectural detailing on a building. Even a pressure cleaning unit this small is capable of eroding a surface, and must be carefully controlled.*

"Line Drop." *Even though the operator of the sandblasting equipment is standing on a ladder to reach the higher sections of the wall, it is still almost impossible to have total control over the pressure. The pressure of the sand hitting the lower portion of the wall will still be greater than that above, because of the "line drop" in the distance from the pressure source to the nozzle. (Hugh Miller)*

Pressure: The damaging effects of most of the variable factors involved in abrasive cleaning are self evident. However, the matter of pressure requires further explanation. In cleaning specifications, pressure is generally abbreviated as "psi" (pounds per square inch), which technically refers to the "tip" pressure, or the amount of pressure at the nozzle of the blasting apparatus. Sometimes "psig," or pressure at the gauge (which may be many feet away, at the other end of the hose), is used in place of "psi." These terms are often incorrectly used interchangeably.

Despite the apparent care taken by most architects and building cleaning contractors to prepare specifications for pressure cleaning which will not cause harm to the delicate fabric of a historic building, it is very difficult to ensure that the same amount of pressure is applied to all parts of the building. For example, if the operator of the pressure equipment stands on the ground while cleaning a two-story structure, the amount of force reaching the first story will be greater than that hitting the second story, even if the operator stands on scaffolding or in a cherry picker, because of the "line drop" in the distance from the pressure source to the nozzle. Although technically it may be possible to prepare cleaning specifications with tight controls that would eliminate all but a small margin of error, it may not be easy to find professional cleaning firms willing to work under such restrictive conditions. The fact is that many professional building cleaning firms do not really understand the extreme delicacy of historic building fabric, and how it differs from modern construction materials. Consequently, they may ac-

cept building cleaning projects for which they have no experience.

The amount of pressure used in any kind of cleaning treatment which involves pressure, whether it is dry or wet grit, chemicals or just plain water, is crucial to the outcome of the cleaning project. Unfortunately, no standards have been established for determining the correct pressure for cleaning each of the many historic building materials which would not cause harm. The considerable discrepancy between the way the building cleaning industry and architectural conservators define "high" and "low" pressure cleaning plays a significant role in the difficulty of creating standards.

Nonhistoric/Industrial: A representative of the building cleaning industry might consider "high" pressure *water* cleaning to be anything over 5,000 psi, or even as high as 10,000 to 15,000 psi! Water under this much pressure may be necessary to clean industrial structures or machinery, but would destroy most historic building materials. Industrial *chemical* cleaning commonly utilizes pressures between 1,000 and 2,500 psi.

Spalling Brick. *This soft, early 19th-century brick was sandblasted in the 1960s; consequently, severe spalling has resulted. Some bricks have almost totally disintegrated, and will eventually have to be replaced. (Robert S. Gamble)*

Historic: By contrast, conscientious dry or wet abrasive cleaning of a historic structure would be conducted within the range of 20 to 100 psi at a range of 3 to 12 inches. Cleaning at this low pressure requires the use of a very fine 00 or 0 mesh grit forced through a nozzle with a ¼ inch opening. A similar, even more delicate method being adopted by architectural conservators uses a micro-abrasive grit on small, hard-to-clean areas of carved, cut or molded ornament on a building façade. Originally developed by museum conservators for cleaning sculpture, this technique may employ glass beads, micro-balloons, or another type of micro-abrasive gently powered at approximately 40 psi by a very small, almost pencil-like pressure instrument. Although a slightly larger pressure instrument may be used on historic buildings, this technique still has limited practical applicability on a large scale building cleaning project because of the cost and the relatively few technicians competent to handle the task. In general, architectural conservators have determined that only through very controlled conditions can most historic building material be abrasively cleaned of soil or paint without measurable damage to the surface or profile of the substrate.

Yet some professional cleaning companies which sepcialize in cleaning historic masonry buildings use chemicals and water at a pressure of approximately 1,500 psi, while other cleaning firms recommend lower pressures ranging from 200 to 800 psi for a similar project. An architectural conservator might decide, *after testing*, that some historic structures could be cleaned properly using a moderate pressure (200–600 psi), or even a high pressure (600–1800 psi) water rinse. However, cleaning historic buildings under such high pressure should be considered an exception rather than the rule, and would require *very careful* testing and supervision to assure that the historic surface materials could withstand the pressure without gouging, pitting or loosening.

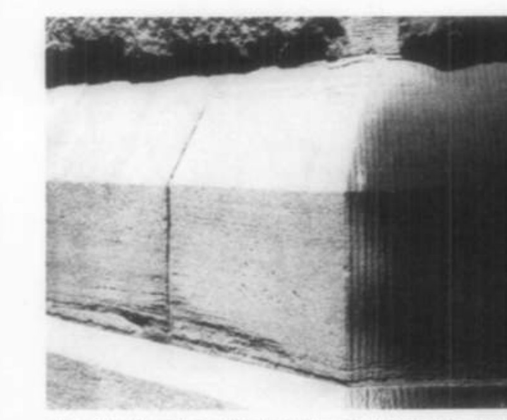
These differences in the amount of pressure used by commercial or industrial building cleaners and architectural conservators point to one of the main problems in using abrasive means to clean historic buildings: misunderstanding of the potentially fragile nature of historic building materials. There is no one cleaning formula or pressure suitable for all situations. Decisions regarding the proper cleaning process for historic structures can be made only after careful analysis of the building fabric, and testing.

How Building Materials React to Abrasive Cleaning Methods

Brick and Architectural Terra-Cotta: Abrasive blasting does not affect all building materials to the same degree. Such techniques quite logically cause greater damage to softer and more porous materials, such as brick or architectural terra-cotta. When these materials are cleaned abrasively, the hard, outer layer (closest to the heat of the kiln) is eroded, leaving the soft, inner core exposed and susceptible to accelerated weathering. Glazed architectural terra-cotta and ceramic veneer have a baked-on glaze which is also easily damaged by abrasive cleaning. Glazed architectual terra-cotta was designed for easy maintenance, and generally can be cleaned using detergent and water; but chemicals or steam may be needed to remove more persistent stains. Large areas of brick or architectural terra-cotta which have been painted are best left painted, or repainted if necessary.

Plaster and Stucco: Plaster and stucco are types of masonry finish materials that are softer than brick or terra-cotta; if treated abrasively these materials will simply disintegrate. Indeed, when plaster or stucco is treated abrasively it is usually with the intention of removing the plaster or stucco from whatever base material or substrate it is covering. Obviously, such abrasive techniques should not be applied to clean sound plaster or stuccoed walls, or decorative plaster wall surfaces.

Building Stones: Building stones are cut from the three main categories of natural rock: dense, igneous rock such as granite; sandy, sedimentary rock such as limestone or sandstone; and crystalline, metamorphic rock such as marble. As op-



Abrasive Cleaning of Tooled Granite. *Even this carefully controlled "wet grit" blasting has erased vertical tooling marks in the cut granite blocks on the left. Not only has the tooling been destroyed, but the damaged stone surface is now more susceptible to accelerated weathering.*

posed to kiln-dried masonry materials such as brick and architectural terra-cotta, building stones are generally homogeneous in character at the time of a building's construction. However, as the stone is exposed to weathering and environmental pollutants, the surface may become friable, or may develop a protective skin or patina. These outer surfaces are very susceptible to damage by abrasive or improper chemical cleaning.

Building stones are frequently cut into ashlar blocks or "dressed" with tool marks that give the building surface a specific texture and contribute to its historic character as much as ornately carved decorative stonework. Such detailing is easily damaged by abrasive cleaning techniques; the pattern of tooling or cutting is erased, and the crisp lines of moldings or carving are worn or pitted.

Occasionally, it may be possible to clean small areas of rough-cut granite, limestone or sandstone having a heavy dirt encrustation by using the "wet grit" method, whereby a small amount of abrasive material is injected into a controlled, pressurized water stream. However, this technique requires very careful supervision in order to prevent damage to the stone. Polished or honed marble or granite should *never* be treated abrasively, as the abrasion would remove the finish in much the way glass would be etched or "frosted" by such a process. It is generally preferable to underclean, as too strong a cleaning procedure will erode the stone, exposing a new and increased surface area to collect atmospheric moisture and dirt. Removing paint, stains or graffiti from most types of stone may be accomplished by a chemical treatment carefully selected to best handle the removal of the particular type of paint or stain without damaging the stone. (See section on the "Gentlest Means Possible")

Abrasive Cleaning of Wood. *This wooden windowsill, molding and paneling have been sandblasted to remove layers of paint in the rehabilitation of this commercial building. Not only is some paint still embedded in cracks and crevices of the woodwork, but more importantly, grit blasting has actually eroded the summer wood, in effect raising the grain, and resulting in a rough surface.*

Wood: Most types of wood used for buildings are soft, fibrous and porous, and are particularly susceptible to damage by abrasive cleaning. Because the summer wood between the lines of the grain is softer than the grain itself, it will be worn away by abrasive blasting or power tools, leaving an uneven surface with the grain raised and often frayed or "fuzzy." Once this has occurred, it is almost impossible to achieve a smooth surface again except by extensive hand sanding, which is expensive and will quickly negate any costs saved earlier by sandblasting. Such harsh cleaning treatment also obliterates historic tool marks, fine carving and detailing, which precludes its use on any interior or exterior woodwork which has been hand planed, milled or carved.

Metals: Like stone, metals are another group of building materials which vary considerably in hardness and durability. Softer metals which are used architecturally, such as tin, zinc, lead, copper or aluminum, generally should not be cleaned abrasively as the process deforms and destroys the original surface texture and appearance, as well as the acquired patina. Much applied architectural metal work used on historic buildings—tin, zinc, lead and copper—is often quite thin and soft, and therefore susceptible to denting and pitting. Galvanized sheet metal is especially vulnerable, as abrasive treatment would wear away the protective galvanized layer.

In the late 19th and early 20th centuries, these metals were often cut, pressed or otherwise shaped from sheets of metal into a wide variety of practical uses such as roofs, gutters and flashing, and façade ornamentation such as cornices, friezes, dormers, panels, cupolas, oriel windows, etc. The architecture of the 1920s and 1930s made use of metals such as chrome, nickel alloys, aluminum and stainless steel in decorative exterior panels, window frames, and doorways. Harsh abrasive blasting would destroy the original surface finish of most of these metals, and would increase the possiblity of corrosion.

However, conservation specialists are now employing a sensitive technique of glass bead peening to clean some of the harder metals, in particular large bronze outdoor sculpture. Very fine (75–125 micron) glass beads are used at a low pressure of 60 to 80 psi. Because these glass beads are completely spherical, ther are no sharp edges to cut the surface of the metal. After cleaning, these statues undergo a lengthy process of polishing. Coatings are applied which protect the surface from corrosion, but they must be renewed every 3 to 5 years. A similarly delicate cleaning technique employing glass beads has been used in Europe to clean historic masonry structures without causing damage. But at this time the process has not been tested sufficiently in the United States to recommend it as a building conservation measure.

Sometimes a very fine *smooth* sand is used at a low pressure to clean or remove paint and corrosion from copper flashing and other metal building components. Restoration architects recently found that a mixture of crushed walnut shells and copper slag at a pressure of approximately 200 psi was the only way to remove corrosion successfully from a mid-19th century terne-coated iron roof. Metal cleaned in this manner must be painted immediately to prevent rapid recurrence of corrosion. It is thought that these methods "work harden" the surface by compressing the outer layer, and actually may be good for the surface of the metal. But the extremely complex nature and the time required by such processes make it very expensive and impractical for large-scale use at this time.

Cast and wrought iron architectural elements may be gently sandblasted or abrasively cleaned using a wire brush to remove layers of paint, rust and corrosion. Sandblasting was, in fact, developed originally as an efficient maintenance procedure for engineering and industrial structures and heavy machinery—iron and steel bridges, machine tool frames, engine frames, and railroad rolling stock—in order to clean and prepare them for repainting. Because iron is hard, its surface,

which is naturally somewhat uneven, will not be noticeably damaged by controlled abrasion. Such treatment will, however, result in a small amount of pitting. But this slight abrasion creates a good surface for paint, since the iron must be repainted immediately to prevent corrosion. Any abrasive cleaning of metal building components will also remove the caulking from joints and around other openings. Such areas must be recaulked quickly to prevent moisture from entering and rusting the metal, or causing deterioration of other building fabric inside the structure.

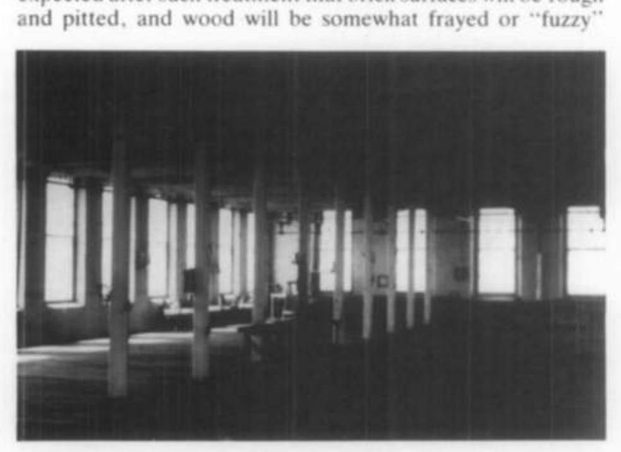
When is Abrasive Cleaning Permissible?

For the most part, abrasive cleaning is destructive to historic building materials. A limited number of special cases have been explained when it may be appropriate, if supervised by a skilled conservator, to use a delicate abrasive technique on some historic building materials. The type of "wet grit" cleaning which involves a small amount of grit injected into a stream of low pressure water may be used on small areas of stone masonry (i.e., rough cut limestone, sandstone or unpolished granite), where milder cleaning methods have not been totally successful in removing harmful deposits of dirt and pollutants. Such areas may include stone window sills, the tops of cornices or column capitals, or other detailed areas of the façade.

This is still an abrasive technique, and without proper caution in handling, it can be *just as harmful to the building surface as any other abrasive cleaning method.* Thus, the decision to use this type of "wet grit" process should be made only after consultation with an experienced building conservator. Remember that *it is very time consuming and expensive to use any abrasive technique on a historic building in such a manner that it does not cause harm to the often fragile and friable building materials.*

At this time, and only under certain circumstances, abrasive cleaning methods may be used in the rehabilitation of interior spaces of warehouse or industrial buildings for contemporary uses.

Interior spaces of factories or warehouse structures in which the masonry or plaster surfaces do not have significant design, detailing, tooling or finish, and in which wooden architectural features are not finished, molded, beaded or worked by hand, may be cleaned abrasively in order to remove layers of paint and industrial discolorations such as smoke, soot, etc. It is expected after such treatment that brick surfaces will be rough and pitted, and wood will be somewhat frayed or "fuzzy" with raised wood grain. These nonsignificant surfaces will be damaged and have a roughened texture, but because they are interior elements, they will not be subject to further deterioration caused by weathering.



Permissible Abrasive Cleaning. *In accordance with the Secretary of the Interior's* Guidelines for Rehabilitation Projects, *it may be acceptable to use abrasive techniques to clean an industrial interior space such as that illustrated here, because the masonry surfaces do not have significant design, detailing, tooling or finish, and the wooden architectural features are not finished, molded, beaded or worked by hand.*

Historic Interiors that Should Not Be Cleaned Abrasively

Those instances (generally industrial and some commercial properties), when it may be acceptable to use an abrasive treatment on the interior of historic structures have been described. But for the majority of historic buildings, the Secretary of the Interior's *Guidelines for Rehabilitation* do not recommend "changing the texture of exposed wooden architectural features (including structural members) and masonry surfaces through sandblasting or use of other abrasive techniques to remove paint, discolorations and plaster. . . ."

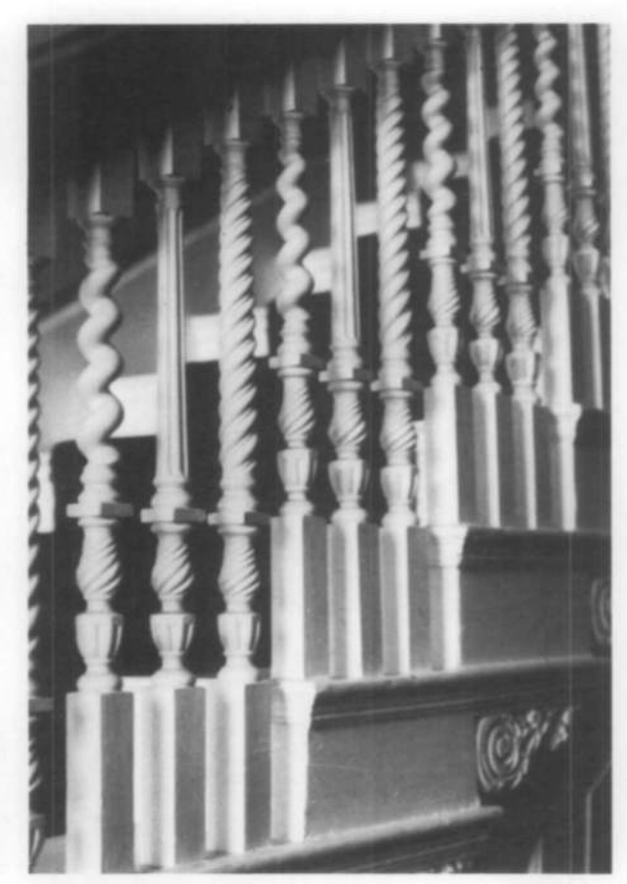
Thus, it is not acceptable to clean abrasively interiors of historic residential and commercial properties which have *finished* interior spaces featuring milled woodwork such as doors, window and door moldings, wainscoting, stair balustrades and mantelpieces. Even the most modest historic *house* interior, although it may not feature elaborate detailing, contains plaster and woodwork that is architecturally significant to the original design and function of the house. Abrasive cleaning of such an interior would be destructive to the historic integrity of the building.

Abrasive cleaning is also impractical. Rough surfaces of abrasively cleaned wooden elements are hard to keep clean. It is also difficult to seal, paint or maintain these surfaces which can be splintery and a problem to the building's occupants. The force of abrasive blasting may cause grit particles to lodge in cracks of wooden elements, which will be a nuisance as the grit is loosened by vibrations and gradually sifts out. Removal of plaster will reduce the thermal and insulating value of the walls. Interior brick is usually softer than exterior brick, and generally of a poorer quality. Removing surface plaster from such brick by abrasive means often exposes gaping mortar joints and mismatched or repaired brickwork which was never intended to show. The resulting bare brick wall may require repointing, often difficult to match. It also may be necessary to apply a transparent surface coating (or sealer) in order to prevent the mortar and brick from "dusting." However, a sealer may not only change the color of the brick, but may also compound any existing moisture problems by restricting the normal evaporation of water vapor from the masonry surface.

"Gentlest Means Possible"

There are alternative means of removing dirt, stains and paint from historic building surfaces that can be recommended as more efficient and less destructive than abrasive techniques. The "gentlest means possible" of removing dirt from a building surface can be achieved by using a low-pressure water wash, scrubbing areas of more persistent grime with a natural bristle (never metal) brush. Steam cleaning can also be used effectively to clean some historic building fabric. Low-pressure water or steam will soften the dirt and cause the deposits to rise to the surface, where they can be washed away.

A third cleaning technique which may be recommended to remove dirt, as well as stains, graffiti or paint, involves the use of commerically available chemical cleaners or paint removers, which, when applied to masonry, loosen or dissolve the dirt or stains. These cleaning agents may be used in combination with water or steam, followed by a clear water wash to remove the residue of dirt and the chemical cleaners from the masonry. A natural bristle brush may also facilitate this type of chemically assisted cleaning, particularly in areas of heavy dirt deposits or stains, and a wooden scraper can be



Do not Abrasively Clean these Interiors. *Most historic residential and some commercial interior spaces contain finished plaster and wooden elements such as this stair balustrade and paneling which contribute to the historic and architectural character of the structure. Such interiors should not be subjected to abrasive techniques for the purpose of removing paint, dirt, discoloration or plaster.*

useful in removing thick encrustations of soot. A limewash or absorbent talc, whiting or clay poultice with a solvent can be used effectively to draw out salts or stains from the surface of the selected areas of a building façade. It is almost impossible to remove paint from masonry surfaces without causing some damage to the masonry, and it is best to leave the surfaces as they are or repaint them if necessary.

Some physicists are experimenting with the use of pulsed laser beams and xenon flash lamps for cleaning historic masonry surfaces. At this time it is a slow, expensive cleaning method, but its initial success indicates that it may have an increasingly important role in the future.

There are many chemical paint removers which, when applied to painted wood, soften and dissolve the paint so that it can be scraped off by hand. Peeling paint can be removed from wood by hand scraping and sanding. Particularly thick layers of paint may be softened with a heat gun or heat plate, providing appropriate precautions are taken, and the paint film scraped off by hand. Too much heat applied to the same spot can burn the wood, and the fumes caused by burning paint are dangerous to inhale, and can be explosive. Furthermore, the hot air from heat guns can start fires in the building cavity. Thus, adequate ventilation is important when using a heat gun or heat plate, as well as when using a chemical stripper. A torch or open flame should never be used.

Preparations for Cleaning: It cannot be overemphasized that all of these cleaning methods must be approached with caution. When using any of these procedures which involve water or other liquid cleaning agents on masonry, it is imperative that *all* openings be tightly covered, and all cracks or joints be well pointed in order to avoid the danger of water penetrating the building's facade, a circumstance which might result in serious moisture related problems such as efflorescence and/or subflorescence. Any time water is used on masonry as a cleaning agent, either in its pure state or in combination with chemical cleaners, it is very important that the work be done in warm weather when there is no danger of frost for several months. Otherwise water which has penetrated the masonry may freeze, eventually causing the surface of the building to crack and spall, which may create another conservation problem more serious to the health of the building than dirt.

Each kind of masonry has a unique composition and reacts differently with various chemical cleaning substances. Water and/or chemicals may interact with minerals in stone and cause new types of stains to leach out to the surface immediately, or more gradually in a delayed reaction. What may be a safe and effective cleaner for certain stain on one type of stone, may leave unattractive discolorations on another stone, or totally dissolve a third type.

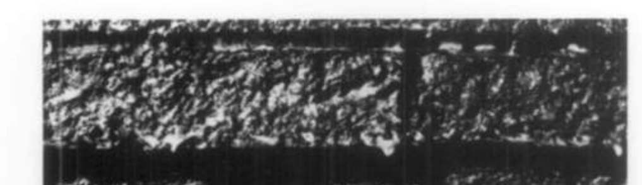
Testing: Cleaning historic building materials, particularly masonry, is a technically complex subject, and thus, should never be done without expert consultation and testing. No cleaning project should be undertaken without first applying the intended cleaning agent to a representative test patch area in an inconspicuous location on the building surface. The test patch or patches should be allowed to weather for a period of time, preferably through a complete seasonal cycle, in order to determine that the cleaned area will not be adversely affected by wet or freezing weather or any by-products of the cleaning process.

Mitigating the Effects of Abrasive Cleaning

There are certain restoration measures which can be adopted to help preserve a historic building exterior which has been damaged by abrasive methods. Wood that has been sandblasted will exhibit a frayed or "fuzzed" surface, or a harder wood will have an exaggerated raised grain. The only way to remove this rough surface or to smooth the grain is by laborious sanding. Sandblasted wood, unless it has been extensively sanded, serves as a dustcatcher, will weather faster, and will present a continuing and ever worsening maintenance problem. Such wood, after sanding, should be painted or given a clear surface coating to protect the wood, and allow for somewhat easier maintenance.

There are few successful preservative treatments that may be applied to grit-blasted exterior masonry. Harder, denser stone may have suffered only a loss of crisp edges or tool marks, or other indications of craft technique. If the stone has a compact and uniform composition, it should continue to weather with little additional deterioration. But some types of sandstone, marble and limestone will weather at an accelerated rate once their protective "quarry crust" or patina has been removed.

Softer types of masonry, particularly brick and architectural terra-cotta, are the most likely to require some remedial treatment if they have been abrasively cleaned. Old brick, being essentially a soft, baked clay product, is greatly susceptible to increased deterioration when its hard, outer skin is removed through abrasive techniques. This problem can be minimized by painting the brick. An alternative is to treat it with a clear sealer or surface coating but this will give the masonry a glossy or shiny look. It is usually preferable to paint the brick rather than to apply a transparent sealer since



Hazards of Sandblasting and Surface Coating. *In order to "protect" this heavily sandblasted brick, a clear surface coating or sealer was applied. Because the air temperature was too cold at the time of application, the sealer failed to dry properly, dripping in places, and giving the brick surface a cloudy appearance.*

sealers reduce the transpiration of moisture, allowing salts to crystallize as subflorescence that eventually spalls the brick. If a brick surface has been so extensively damaged by abrasive cleaning and weathering that spalling has already begun, it may be necessary to cover the walls with stucco, if it will adhere.

Of course, the application of paint, a clear surface coating (sealer), or stucco to deteriorating masonry means that the historical appearance will be sacrificed in an attempt to conserve the historic building materials. However, the original color and texture will have been changed already by the abrasive treatment. At this point it is more important to try to preserve the brick, and there is little choice but to protect it from "dusting" or spalling too rapidly. As a last resort, in the case of severely spalling brick, there may be no option but to replace the brick—a difficult, expensive (particularly if custom-made reproduction brick is used), and lengthy process. As described earlier, sandblasted interior brick work, while not subject to change of weather, may require the application of a transparent surface coating or painting as a maintenance procedure to contain loose mortar and brick dust. (See Preservation Briefs: No. 1 for a more thorough discussion of coatings.)

Metals, other than cast or wrought iron, that have been pitted and dented by harsh abrasive blasting usually cannot be smoothed out. Although fillers may be satisfactory for smoothing a painted surface, exposed metal that has been damaged usually will have to be replaced.

Summary

Sandblasting or other abrasive methods of cleaning or paint removal are by their nature destructive to historic building materials and should not be used on historic buildings except in a few well-monitored instances. There are exceptions when certain types of abrasive cleaning may be permissible, but only if conducted by a trained conservator, and if cleaning is necessary for the preservation of the historic structure.

There is no one formula that will be suitable for cleaning all historic building surfaces. Although there are many commerical cleaning products and methods available, it is impossible to state definitively which of these will be the most effective without causing harm to the building fabric. It is often difficult to identify ingredients or their proportions contained in cleaning products; consequently it is hard to predict how a product will react to the building materials to be cleaned. Similar uncertanities affect the outcome of other cleaning methods as they are applied to historic building materials. Further advances in understanding the complex nature of the many variables of the cleaning techniques may someday provide a better and simpler solution to the problems. But until that time, the process of cleaning historic buildings must be approached with caution through trial and error.

It is important to remember that historic building materials are neither indestructible, nor are they renewable. They must be treated in a responsible manner, which may mean little or no cleaning at all if they are to be preserved for future generations to enjoy. If it is in the best interest of the building to clean it, then it should be done "using the gentlest means possible."

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This Preservation Brief was written by Anne E. Grimmer, Architectural Historian, Technical Preservation Services Division. Valuable suggestions and comments were made by Hugh C. Miller, AIA, Washington, D.C.; Martin E. Weaver, Ottawa, Ontario, Canada; Terry Bryant, Downers Grove, Illinois; Daniel C. Cammer, McLean, Virginia; and the professional staff of Technical Preservation Services Division. Deborah Cooney edited the final manuscript.

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FLORIDA DEPARTMENT OF STATE Historical Resources

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NO.	DATE	DESCRIPTION

DATE:	04.10.2023
MODELED:	LA
CHECKED:	BL/ REG
REG PROJECT #:	22029

HG - EXTERIOR CLEANING

Construction Document Set

A-20

[8] Regular maintenance includes removing leaves that can clog gutters and cause water damage to the exterior and interior walls of a house.

ROOFS

RECOMMENDED	NOT RECOMMENDED
Identifying, retaining, and preserving roofs and their functional and decorative features that are important in defining the overall historic character of the building. The form of the roof (gable, hipped, gambrel, flat, or mansard) is significant, as are its decorative and functional features (such as cupolas, cresting, parapets, monitors, chimneys, weather vanes, dormers, ridge tiles, and snow guards), roofing material (such as slate, wood, clay tile, metal, roll roofing, or asphalt shingles), and size, color, and patterning.	Altering the roof and roofing materials which are important in defining the overall historic character of the building so that, as a result, the character is diminished. Replacing historic roofing material instead of repairing or replacing only the deteriorated material. Changing the type or color of roofing materials.
Stabilizing deteriorated or damaged roofs as a preliminary measure, when necessary, prior to undertaking preservation work.	Failing to stabilize a deteriorated or damaged roof until additional work is undertaken, thereby allowing further damage to occur to the historic building
Protecting and maintaining a roof by cleaning gutters and downspouts and replacing deteriorated flashing. Roof sheathing should also be checked for indications of moisture due to leaks or condensation.	Failing to clean and maintain gutters and downspouts properly so that water and debris collect and cause damage to roof fasteners, sheathing, and the underlying structure
Providing adequate anchorage for roofing material to guard against wind damage and moisture penetration.	Allowing flashing, caps, and exposed roof fasteners to corrode, which accelerates deterioration of the roof.
Protecting a leaking roof with a temporary waterproof membrane with a synthetic underlayment, roll roofing, plywood, or a tarpaulin until it can be repaired.	Leaving a leaking roof unprotected so that accelerated deterioration of historic building materials (such as masonry, wood, plaster, paint, and structural members) occurs.
Repainting a roofing material that requires a protective coating and was painted historically (such as a terneplate metal roof or gutters) as part of regularly-scheduled maintenance.	Failing to repaint a roofing material that requires a protective coating and was painted historically as part of regularly-scheduled maintenance.
Protecting a roof covering when working on other roof features.	Failing to protect roof coverings when working on other roof features.
Evaluating the overall condition of the roof to determine whether more than protection and maintenance, such as repairs to roof features, will be necessary.	Failing to undertake adequate measures to ensure the protection of roof features.
Repairing a roof by ensuring that the existing historic roof or compatible non-historic roof covering is sound and waterproof.	Removing historic materials that could be repaired or using improper repair techniques. Failing to reuse intact slate or tile when only the roofing substrate or fasteners need replacement.

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U.S. Department of the Interior
National Park Service
Cultural Resources
Heritage Preservation Services

Preservation Briefs: 9
The Repair of Historic Wooden Windows

John H. Myers

The windows on many historic buildings are an important aspect of the architectural character of those buildings. Their design, craftsmanship, or other qualities may make them worthy of preservation. This is self-evident for ornamental windows, but it can be equally true for warehouses or factories where the windows may be the most dominant visual element of an otherwise plain building (see figure 1). Evaluating the significance of these windows and planning for their repair or replacement can be a complex process involving both objective and subjective considerations. The *Secretary of the Interior's Standards for Rehabilitation*, and the accompanying guidelines, call for respecting the significance of original materials and features, repairing and retaining them wherever possible, and when necessary, replacing them in kind. This **Brief** is based on the issues of significance and repair which are implicit in the standards, but the primary emphasis is on the technical issues of planning for the repair of windows including evaluation of their physical condition, techniques of repair, and design considerations when replacement is necessary.

Figure 1. *Windows are frequently important visual focal points, especially on simple facades such as this mill building. Replacement of the multi-pane windows here with larger panes could dramatically change the appearance of the building. The areas of missing windows convey the impression of such a change. Photo: John T. Lowe*

Much of the technical section presents repair techniques as an instructional guide for the do-it-yourselfer. The information will be useful, however, for the architect, contractor, or developer on large-scale projects. It presents a methodology for approaching the evaluation and repair of existing windows, and considerations for replacement, from which the professional can develop alternatives and specify appropriate materials and procedures.

Architectural or Historical Significance

Evaluating the architectural or historical significance of windows is the first step in planning for window treatments, and a general understanding of the function and history of windows is vital to making a proper evaluation. As a part of this evaluation, one must consider four basic window functions: admitting light to the interior spaces, providing fresh air and ventilation to the interior, providing a visual link to the outside world, and enhancing the appearance of a building. No single factor can be disregarded when planning window treatments; for example, attempting to conserve energy by closing up or reducing the size of window openings may result in the use of *more* energy by increasing electric lighting loads and decreasing passive solar heat gains.

Historically, the first windows in early American houses were casement windows; that is, they were hinged at the side and opened outward. In the beginning of the eighteenth century single- and double-hung windows were introduced. Subsequently many styles of these vertical sliding sash windows have come to be associated with specific building periods or architectural styles, and this is an important consideration in determining the significance of windows, especially on a local or regional basis. Site-specific, regionally oriented architectural comparisons should be made to determine the significance of windows in question. Although such comparisons may focus on specific window types and their details, the ultimate determination of significance should be made within the context of the whole building, wherein the windows are one architectural element (see figure 2).

After all of the factors have been evaluated, *windows should be considered significant to a building if they:* 1) are original, 2) reflect the original design intent for the building, 3) reflect period or regional styles or building practices, 4) reflect changes to the building resulting from major periods or events, or 5) are examples of exceptional craftsmanship or design. Once this evaluation of significance has been completed, it is possible to proceed with planning appropriate treatments, beginning with an investigation of the physical condition of the windows.

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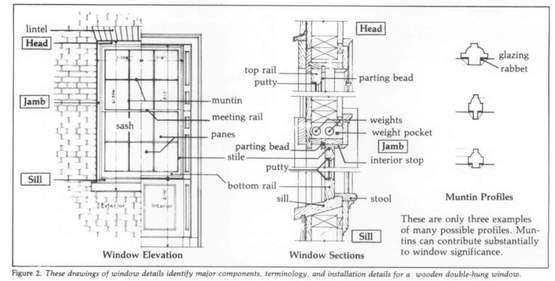

Figure 2. *These drawings of window details identify major components, terminology, and installation details for a wooden double-hung window.*

Physical Evaluation

The key to successful planning for window treatments is a careful evaluation of existing physical conditions on a unit-by-unit basis. A graphic or photographic system may be devised to record existing conditions and illustrate the scope of any necessary repairs. Another effective tool is a window schedule which lists all of the parts of each window unit. Spaces by each part allow notes on existing conditions and repair instructions. When such a schedule is completed, it indicates the precise tasks to be performed in the repair of each unit and becomes a part of the specifications. In any evaluation, one should note at a minimum, 1) window location, 2) condition of the paint, 3) condition of the frame and sill, 4) condition of the sash (rails, stiles and muntins), 5) glazing problems, 6) hardware, and 7) the overall condition of the window (excellent, fair, poor, and so forth).

Many factors such as poor design, moisture, vandalism, insect attack, and lack of maintenance can contribute to window deterioration, but moisture is the primary contributing factor in wooden window decay. All window units should be inspected to see if water is entering around the edges of the frame and, if so, the joints or seams should be caulked to eliminate this danger. The glazing putty should be checked for cracked, loose, or missing sections which allow water to saturate the wood, especially at the joints. The back putty on the interior side of the pane should also be inspected, because it creates a seal which prevents condensation from running down into the joinery. The sill should be examined to insure that it slopes downward away from the building and allows water to drain off. In addition, it may be advisable to cut a dripline along the underside of the sill. This almost invisible treatment will insure proper water run-off, particularly if the bottom of the sill is flat. Any conditions, including poor original design, which permit water to come in contact with the wood or to puddle on the sill must be corrected as they contribute to deterioration of the window.

One clue to the location of areas of excessive moisture is the condition of the paint; therefore, each window should be examined for areas of paint failure. Since excessive moisture is detrimental to the paint bond, areas of paint blistering, cracking, flaking, and peeling usually identify points of water penetration, moisture saturation, and potential deterioration. Failure of the paint should not, however, be mistakenly interpreted as a sign that the wood is in poor condition and hence, irreparable. Wood is frequently in sound physical condition beneath unsightly paint. After noting areas of paint failure, the next step is to inspect the condition of the wood, particularly at the points identified during the paint examination.

Each window should be examined for operational soundness beginning with the lower portions of the frame and sash. Exterior rainwater and interior condensation can flow downward along the window, entering and collecting at points where the flow is blocked. The sill, joints between the sill and jamb, corners of the bottom rails and muntin joints are typical points where water collects and deterioration begins (see figure 3). The operation of the window (continuous opens and closing over the years and seasonal temperature changes) weakens the joints, causing movement and slight separation. This process makes the joints more vulnerable to water which is readily absorbed into the end-grain of the wood. If severe deterioration exists in these areas, it will usually be apparent on visual inspection, but other less severely deteriorated areas of the wood may be tested by two traditional methods using a small ice pick.

An ice pick or an awl may be used to test wood for soundness. The technique is simply to jab the pick into a wetted wood surface at an angle and pry up a small sec-

Figure 3. *Deterioration of poorly maintained windows usually begins on horizontal surfaces and at joints where water can collect and saturate the wood. The problem areas are clearly indicated by paint failure due to moisture. Photo: Baird M. Smith, AIA*

tion of the wood. Sound wood will separate in long fibrous splinters, but decayed wood will lift up in short irregular pieces due to the breakdown of fiber strength.

Another method of testing for soundness consists of pushing a sharp object into the wood, perpendicular to the surface. If deterioration has begun from the hidden side of a member and the core is badly decayed, the visible surface may appear to be sound wood. Pressure on the probe can force it through an apparently sound skin to penetrate deeply into decayed wood. This technique is especially useful for checking sills where visual access to the underside is restricted.

Following the inspection and analysis of the results, the scope of the necessary repairs will be evident and a plan for the rehabilitation can be formulated. Generally the actions necessary to return a window to "like new" condition will fall into three broad categories: 1) routine maintenance procedures, 2) structural stabilization, and 3) parts replacement. These categories will be discussed in the following sections and will be referred to respectively as Repair Class I, Repair Class II, and Repair Class III. Each successive repair class represents an increasing level of difficulty, expense, and work time. Note that most of the points mentioned in Repair Class I are routine maintenance items and should be provided in a regular maintenance program for any building. The neglect of these routine items can contribute to many common window problems.

Before undertaking any of the repairs mentioned in the following sections all sources of moisture penetration should be identified and eliminated, and all existing decay fungi destroyed in order to arrest the deterioration process. Many commercially available fungicides and wood preservatives are toxic, so it is extremely important to follow the manufacturer's recommendations for application, and store all chemical materials away from children and animals. After fungicidal and preservative treatment the windows may be stabilized, retained, and restored with every expectation for a long service life.

Repair Class I: Routine Maintenance

Repairs to wooden windows are usually labor intensive and relatively uncomplicated. On small scale projects this allows the do-it-yourselfer to save money by repairing all or part of the windows. On larger projects it presents the opportunity for time and money which might otherwise be spent on the removal and replacement of existing windows, to be spent on repairs, subsequently saving all or part of the material cost of new window units. Regardless of the actual costs, or who performs the work, the evaluation process described earlier will provide the knowledge from which to specify an appropriate work program, establish the work element priorities, and identify the level of skill needed by the labor force.

The routine maintenance required to upgrade a window to "like new" condition normally includes the following steps: 1) some degree of interior and exterior paint removal, 2) removal and repair of sash (including reglazing where necessary), 3) repairs to the frame, 4) weatherstripping and reinstallation of the sash, and 5) repainting. These operations are illustrated for a typical double-hung wooden window (see figures 4a-f), but they may be adapted to other window types and styles as applicable.

Historic windows have usually acquired many layers of paint over time. Removal of excess layers or peeling and flaking paint will facilitate operation of the window and restore the clarity of the original detailing. Some degree of paint removal is also necessary as a first step in the proper surface preparation for subsequent refinishing (if paint color analysis is desired, it should be conducted prior to the onset of the paint removal). There are several safe and effective techniques for removing paint from wood, depending on the amount of paint to be removed. Several techniques such as scraping, chemical stripping, and the use of a hot air gun are discussed in "Preservation Briefs: 10 Paint Removal from Historic Woodwork" (see Additional Reading section at end).

Paint removal should begin on the interior frames, being careful to remove the paint from the interior stop and the parting bead, particularly along the seam where these stops meet the jamb. This can be accomplished by running a utility knife along the length of the seam, breaking the paint bond. It will then be much easier to remove the stop, the parting bead and the sash. The interior stop may be initially loosened from the sash side to avoid visible scarring of the wood and then gradually pried loose using a pair of putty knives, working up and down the stop in small increments (see figure 4b). With the stop removed, the lower or interior sash may be withdrawn. The sash cords should be detached from the sides of the sash and their ends may be pinned with a nail or tied in a knot to prevent them from falling into the weight pocket.

Removal of the upper sash on double-hung units is similar but the parting bead which holds it in place is set into a groove in the center of the stile and is thinner and more delicate than the interior stop. After removing any paint along the seam, the parting bead should be carefully pried out and worked free in the same manner as the interior stop. The upper sash can be removed in the same manner as the lower one and both sash taken to a convenient work area (in order to remove the sash the interior stop and parting bead need only be removed from one side of the window). Window openings can be covered with polyethylene sheets or plywood sheathing while the sash are out for repair.

The sash can be stripped of paint using appropriate techniques, but if any heat treatment is used (see figure 4c), the glass should be removed or protected from the sudden temperature change which can cause breakage. An

Figure 4a. *The following series of photographs of the repair of a historic double-hung window use a unit which is structurally sound but has many layers of paint, some cracked and missing putty, slight separation at the joints, broken sash cords, and one cracked pane. Photo: John H. Myers*

Figure 4b. *After removing paint from the seam between the interior stop and the jamb, the stop can be pried out and gradually worked loose using a pair of putty knives as shown. To avoid visible scarring of the wood, the sash can be raised and the stop pried loose initially from the outer side. Photo: John H. Myers*

Figure 4c. *Sash can be removed and repaired in a convenient work area. Paint is being removed from this sash with a hot air gun while an asbestos sheet protects the glass from sudden temperature change. Photo: John H. Myers*

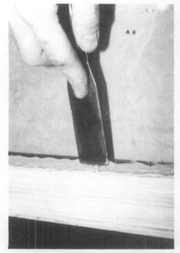

Figure 4d. *Reglazing or replacement of the putty requires that the existing putty be removed manually, the glazing points be extracted, the glass removed, and the back putty scraped out. To reglaze, a bed of putty is laid around the perimeter of the rabbet, the pane is pressed into place, glazing points are inserted to hold the pane (shown), and a final seal of putty is beveled around the edge of the glass. Photo: John H. Myers*

Figure 4e. *A common repair is the replacement of broken sash cords with new cords (shown) or with chains. The weight pocket is often accessible through a removable plate in the jamb, or by removing the interior trim. Photo: John H. Myers*

Figure 4f. *Following the relatively simple repairs, the window is weathertight, like new in appearance, and serviceable for many years to come. Both the historic material and the detailing and craftsmanship of this original window have been preserved. Photo: John H. Myers*

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overlay of aluminum foil on gypsum board or asbestos can protect the glass from such rapid temperature change. It is important to protect the glass because it may be historic and often adds character to the window. Deteriorated putty should be removed manually, taking care not to damage the wood along the rabbet. If the glass is to be removed, the glazing points which hold the glass in place can be extracted and the panes numbered and removed for cleaning and reuse in the same openings. With the glass panes out, the remaining putty can be removed and the sash can be sanded, patched, and primed with a preservative primer. Hardened putty in the rabbets may be softened by heating with a soldering iron at the point of removal. Putty remaining on the glass may be softened by soaking the panes in linseed oil, and then removed with less risk of breaking the glass. Before reinstalling the glass, a bead of glazing compound or linseed oil putty should be laid around the rabbet to cushion and seal the glass. Glazing compound should only be used on wood which has been brushed with linseed oil and primed with an oil based primer or paint. The pane is then pressed into place and the glazing points are pushed into the wood around the perimeter of the pane (see figure 4d). The final glazing compound or putty is applied and beveled to complete the seal. The sash can be refinished as desired on the inside and painted on the outside as soon as a "skin" has formed on the putty, usually in 2 or 3 days. Exterior paint should cover the beveled glazing compound or putty and lap over onto the glass slightly to complete a weathertight seal. After the proper curing times have elapsed for paint and putty, the sash will be ready for reinstallation.

While the sash are out of the frame, the condition of the wood in the jamb and sill can be evaluated. Repair and refinishing of the frame may proceed concurrently with repairs to the sash, taking advantage of the curing times for the paints and putty used on the sash. One of the most common work items is the replacement of the sash cords with new rope cords or with chains (see figure 4e). The weight pocket is frequently accessible through a door on the face of the frame near the sill, but if no door exists, the trim on the interior face may be removed for access. Sash weights may be increased for easier window operation by elderly or handicapped persons. Additional repairs to the frame and sash may include consolidation or replacement of deteriorated wood. Techniques for these repairs are discussed in the following sections.

The operations just discussed summarize the efforts necessary to restore a window with minor deterioration to "like new" condition (see figure 4f). The techniques can be applied by an unskilled person with minimal training and experience. To demonstrate the practicality of this approach, and photograph it, a Technical Preservation Services staff member repaired a wooden double-hung, two over two window which had been in service over ninety years. The wood was structurally sound but the window had one broken pane, many layers of paint, broken sash cords and inadequate, worn-out weatherstripping. The staff member found that the frame could be stripped of paint and the sash removed quite easily. Paint, putty and glass removal required about one hour for each sash, and the reglazing of both sash was accomplished in about one hour. Weatherstripping of the sash and frame, replacement of the sash cords and reinstallation of the sash, parting bead, and stop required an hour and a half. These times refer only to individual operations; the entire process took several days due to the drying and curing times for putty, primer, and paint, however, work on other window units could have been in progress during these lag times.

Repair Class II: Stabilization

The preceding description of a window repair job focused on a unit which was operationally sound. Many windows will show some additional degree of physical deterioration, especially in the vulnerable areas mentioned earlier, but even badly damaged windows can be repaired using simple processes. Partially decayed wood can be waterproofed, patched, built-up, or consolidated and then painted to achieve a sound condition, good appearance, and greatly extended life. Three techniques for repairing partially decayed or weathered wood are discussed in this section, and all three can be accomplished using products available at most hardware stores.

One established technique for repairing wood which is split, checked or shows signs of rot, is to: 1) dry the wood, 2) treat decayed areas with a fungicide, 3) waterproof with two or three applications of boiled linseed oil (applications every 24 hours), 4) fill cracks and holes with putty, and 5) after a "skin" forms on the putty, paint the surface. Care should be taken with the use of fungicide which is toxic. Follow the manufacturers' directions and use only on areas which will be painted. When using any technique of building up or patching a flat surface, the finished surface should be sloped slightly to carry water away from the window and not allow it to puddle. Caulking of the joints between the sill and the jamb will help reduce further water penetration.

When sills or other members exhibit surface weathering they may also be built-up using wood putties or home-made mixtures such as sawdust and resorcinol glue, or whiting and varnish. These mixtures can be built up in successive layers, then sanded, primed, and painted. The same caution about proper slope for flat surfaces applies to this technique.

Wood may also be strengthened and stabilized by consolidation, using semi-rigid epoxies which saturate the porous decayed wood and then harden. The surface of the consolidated wood can then be filled with a semi-rigid epoxy patching compound, sanded and painted (see figure 5). Epoxy patching compounds can be used to build up

Figure 5. This illustrates a two-part epoxy patching compound used to fill the surface of a weathered sill and rebuild the missing edge. When the epoxy cures, it can be sanded smooth and painted to achieve a durable and waterproof repair. Photo: John H. Myers

missing sections or decayed ends of members. Profiles can be duplicated using hand molds, which are created by pressing a ball of patching compound over a sound section of the profile which has been rubbed with butcher's wax. This can be a very efficient technique where there are many typical repairs to be done. Technical Preservation Services has published *Epoxies for Wood Repairs in Historic Buildings* (see Additional Reading section at end), which discusses the theory and techniques of epoxy repairs. The process has been widely used and proven in marine applications; and proprietary products are available at hardware and marine supply stores. Although epoxy materials may be comparatively expensive, they hold the promise of being among the most durable and long lasting materials available for wood repair.

Any of the three techniques discussed can stabilize and restore the appearance of the window unit. There are times, however, when the degree of deterioration is so advanced that stabilization is impractical, and the only way to retain some of the original fabric is to replace damaged parts.

Repair Class III: Splices and Parts Replacement

When parts of the frame or sash are so badly deteriorated that they cannot be stabilized there are methods which permit the retention of some of the existing or original fabric. These methods involve replacing the deteriorated parts with new matching pieces, or splicing new wood into existing members. The techniques require more skill and are more expensive than any of the previously discussed alternatives. It is necessary to remove the sash and/or the affected parts of the frame and have a carpenter or woodworking mill reproduce the damaged or missing parts. Most millwork firms can duplicate parts, such as muntins, bottom rails, or sills, which can then be incorporated into the existing window, but it may be necessary to shop around because there are several factors controlling the practicality of this approach. Some woodworking mills do not like to repair old sash because nails or other foreign objects in the sash can damage expensive knives (which cost far more than their profits on small repair jobs); others do not have cutting knives to duplicate muntin profiles. Some firms prefer to concentrate on larger jobs with more profit potential, and some may not have a craftsman who can duplicate the parts. A little searching should locate a firm which will do the job, and at a reasonable price. If such a firm does not exist locally, there are firms which undertake this kind of repair and ship nationwide. It is possible, however, for the advanced do-it-yourselfer or craftsman with a table saw to duplicate moulding profiles using techniques discussed by Gordie Whittington in "Simplified Methods for Reproducing Wood Mouldings," *Bulletin* of the Association for Preservation Technology, Vol. III, No. 4, 1971, or illustrated more recently in *The Old House*, Time-Life Books, Alexandria, Virginia, 1979.

The repairs discussed in this section involve window frames which may be in very deteriorated condition, possibly requiring removal; therefore, caution is in order. The actual construction of wooden window frames and sash is not complicated. Pegged mortise and tenon units can be disassembled easily, if the units are out of the building. The installation or connection of some frames to the surrounding structure, especially masonry walls, can complicate the work immeasurably, and may even require dismantling of the wall. It may be useful, therefore, to take the following approach to frame repair: 1) conduct regular maintenance of sound frames to achieve the longest life possible, 2) make necessary repairs in place wherever possible, using stabilization and splicing techniques, and 3) if removal is necessary, thoroughly investigate the structural detailing and seek appropriate professional consultation.

Another alternative may be considered if parts replacement is required, and that is sash replacement. If extensive replacement of parts is necessary and the job becomes prohibitively expensive it may be more practical to purchase new sash which can be installed into the existing frames. Such sash are available as exact custom reproductions, reasonable facsimiles (custom windows with similar profiles), and contemporary wooden sash which are similar in appearance. There are companies which still manufacture high quality wooden sash which would duplicate most historic sash. A few calls to local building suppliers may provide a source of appropriate replacement sash, but if not, check with local historical associations, the state historic preservation office, or preservation related magazines and supply catalogs for information.

If a rehabilitation project has a large number of windows such as a commercial building or an industrial complex, there may be less of a problem arriving at a solution. Once the evaluation of the windows is completed and the scope of the work is known, there may be a potential economy of scale. Woodworking mills may be interested in the work from a large project; new sash in volume may be considerably less expensive per unit; crews can be assembled and trained on site to perform all of the window repairs; and a few extensive repairs can be absorbed (without undue burden) into the total budget for a large number of sound windows. While it may be expensive for the average historic home owner to pay seventy dollars or more for a mill to grind a custom knife to duplicate four or five bad muntins, that cost becomes negligible on large commercial projects which may have several hundred windows.

Most windows should not require the extensive repairs discussed in this section. The ones which do are usually in buildings which have been abandoned for long periods or have totally lacked maintenance for years. It is necessary to thoroughly investigate the alternatives for windows which do require extensive repairs to arrive at a solution which retains historic significance and is also economically feasible. Even for projects requiring repairs identified in this section, if the percentage of parts replacement per window is low, or the number of windows requiring repair is small, repair can still be a cost effective solution.

Weatherization

A window which is repaired should be made as energy efficient as possible by the use of appropriate weatherstripping to reduce air infiltration. A wide variety of products are available to assist in this task. Felt may be fastened to the top, bottom, and meeting rails, but may have the disadvantage of absorbing and holding moisture, particularly at the bottom rail. Rolled vinyl strips may also be tacked into place in appropriate locations to reduce infiltration. Metal strips or new plastic spring strips may be used on the rails and, if space permits, in

the channels between the sash and jamb. Weatherstripping is a historic treatment, but old weatherstripping (felt) is not likely to perform very satisfactorily. Appropriate contemporary weatherstripping should be considered an integral part of the repair process for windows. The use of sash locks installed on the meeting rail will insure that the sash are kept tightly closed so that the weatherstripping will function more effectively to reduce infiltration. Although such locks will not always be historically accurate, they will usually be viewed as an acceptable contemporary modification in the interest of improved thermal performance.

Many styles of storm windows are available to improve the thermal performance of existing windows. The use of exterior storm windows should be investigated whenever feasible because they are thermally efficient, cost-effective, reversible, and allow the retention of original windows (see "Preservation Briefs: 3"). Storm window frames may be made of wood, aluminum, vinyl, or plastic; however, the use of unfinished aluminum storms should be avoided. The visual impact of storms may be minimized by selecting colors which match existing trim color. Arched top storms are available for windows with special shapes. Although interior storm windows appear to offer an attractive option for achieving double glazing with minimal visual impact, the potential for damaging condensation problems must be addressed. Moisture which becomes trapped between the layers of glazing can condense on the colder, outer prime window, potentially leading to deterioration. The correct approach to using interior storms is to create a seal on the interior storm while allowing some ventilation around the prime window. In actual practice, the creation of such a durable, airtight seal is difficult.

Window Replacement

Although the retention of original or existing windows is always desirable and this Brief is intended to encourage that goal, there is a point when the condition of a window may clearly indicate replacement. The decision process for selecting replacement windows should *not* begin with a survey of contemporary window products which are available as replacements, but should begin with a look at the windows which are being replaced. Attempt to understand the contribution of the window(s) to the appearance of the facade including; 1) the pattern of the openings and their size; 2) proportions of the frame and sash; 3) configuration of window panes; 4) muntin profiles; 5) type of wood; 6) paint color; 7) characteristics of the glass; and 8) associated details such as arched tops, hoods, or other decorative elements. Develop an understanding of how the window reflects the period, style, or regional characteristics of the building, or represents technological development.

Armed with an awareness of the significance of the existing window, begin to search for a replacement which retains as much of the character of the historic window as possible. There are many sources of suitable new windows. Continue looking until an acceptable replacement can be found. Check building supply firms, local woodworking mills, carpenters, preservation oriented magazines, or catalogs or suppliers of old building materials, for product information. Local historical associations and state historic preservation offices may be good sources of information on products which have been used successfully in preservation projects.

Consider energy efficiency as one of the factors for replacements, but do not let it dominate the issue. Energy conservation is no excuse for the wholesale destruction of historic windows which can be made thermally efficient by historically and aesthetically acceptable means. In fact, a historic wooden window with a high quality storm window added should thermally outperform a new double-glazed metal window which does not have thermal breaks (insulation between the inner and outer frames intended to break the path of heat flow). This occurs because the wood has far better insulating value than the metal, and in addition many historic windows have high ratios of wood to glass, thus reducing the area of highest heat transfer. One measure of heat transfer is the U-value, the number of Btu's per hour transferred through a square foot of material. When comparing thermal performance, the lower the U-value the better the performance. According to *ASHRAE 1977 Fundamentals*, the U-values for single glazed wooden windows range from 0.88 to 0.99. The addition of a storm window should reduce these figures to a range of 0.44 to 0.49. A non-thermal break, double-glazed metal window has a U-value of about 0.6.

Conclusion

Technical Preservation Services recommends the retention and repair of original windows whenever possible. We believe that the repair and weatherization of existing wooden windows is more practical than most people realize, and that many windows are unfortunately replaced because of a lack of awareness of techniques for evaluation, repair, and weatherization. Wooden windows which are repaired and properly maintained will have greatly extended service lives while contributing to the historic character of the building. Thus, an important element of a building's significance will have been preserved for the future.

Additional Reading

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22 PRESERVATION BRIEFS

The Preservation and Repair of Historic Stucco

Anne Grimmer

U.S. Department of the Interior
National Park Service
Preservation Assistance Division

The term "stucco" is used here to describe a type of exterior plaster applied as a two-or-three part coating directly onto masonry, or applied over wood or metal lath to a log or wood frame structure. Stucco is found in many forms on historic structures throughout the United States. It is so common, in fact, that it frequently goes unnoticed, and is often disguised or used to imitate another material. Historic stucco is also sometimes incorrectly viewed as a sacrificial coating, and consequently removed to reveal stone, brick or logs that historically were never intended to be exposed. Age and lack of maintenance hasten the deterioration of many historic stucco buildings. Like most historic building materials, stucco is at the mercy of the elements, and even though it is a protective coating, it is particularly susceptible to water damage.

Stucco is a material of deceptive simplicity: in most cases its repair should not be undertaken by a property owner unfamiliar with the art of plastering. Successful stucco repair requires the skill and experience of a professional plasterer. Therefore, this Brief has been prepared to provide background information on the nature and components of traditional stucco, as well as offer guidance on proper maintenance and repairs. The Brief will outline the requirements for stucco repair, and, when necessary, replacement. Although several stucco mixes representative of different periods are provided here for reference, this Brief does not include specifications for carrying out repair projects. Each project is unique, with its own set of problems that require individual solutions.

Fig. 1. These two houses in a residential section of Winchester, Virginia, illustrate the continuing popularity of stucco (a) from this early 19th century, Federal style house on the left, (b) to the English Cotswold style cottage that was built across the street in the 1930's. Photos: Anne Grimmer.

Historical Background

Stucco has been used since ancient times. Still widely used throughout the world, it is one of the most common of traditional building materials (Fig. 1). Up until the late 1800's, stucco, like mortar, was primarily lime-based, but the popularization of portland cement changed the composition of stucco, as well as mortar, to a harder material. Historically, the term "plaster" has often been interchangeable with "stucco"; the term is still favored by many, particularly when referring to the traditional lime-based coating. By the nineteenth century "stucco," although originally denoting fine interior ornamental plasterwork, had gained wide acceptance in the United States to describe exterior plastering. "Render" and "rendering" are also terms used to describe stucco, especially in Great Britain. Other historic treatments and coatings related to stucco in that they consist at least in part of a similarly plastic or malleable material include: parging and pargeting, wattle and daub, "cob" or chalk mud, pisé de terre, rammed earth, briquete entre poteaux or boussillage, half-timbering, and adobe. All of these are regional variations on traditional mixtures of mud, clay, lime, chalk, cement, gravel or straw. Many are still used today.

The Stucco Tradition in the United States

Stucco is primarily used on residential buildings and relatively small-scale commercial structures. Some of the earliest stucco buildings in the United States include examples of the Federal, Greek and Gothic Revival styles of the eighteenth and the nineteenth centuries that emulated European architectural fashions. Benjamin Henry Latrobe, appointed by Thomas Jefferson as Surveyor of Public Buildings of the United States in 1803, was responsible for the design of a number of important stucco buildings, including St. John's Church (1816), in Washington, D.C. (Fig. 2). Nearly half a century later Andrew Jackson Downing also advocated the use of stucco in his influential book *The Architecture of Country Houses,* published in 1850. In Downing's opinion, stucco was superior in many respects to plain brick or stone because it was cheaper, warmer and dryer, and could be "agreeably" tinted. As a result of his advice, stuccoed Italianate style urban and suburban villas proliferated in many parts of the country during the third quarter of the nineteenth century.

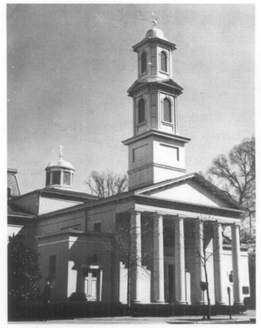

Fig. 2. St. John's Church, Washington, D.C., constructed of brick and stuccoed immediately upon completion in 1816, reflects the influence of European, and specifically English, architectural styles. Photo: Russell Jones, HABS Collection.

Fig. 3. The William Gray and Edna S. Purcell House, Minneapolis, Minnesota, was designed in 1913 by the architects Purcell and Elmslie in the Prairie style. Stuccoed in a salmon-pink, sand (float) finish, it is unusual in that it featured a 3-color geometric frieze stencilled below the eaves of the 2nd story. The Minneapolis Institute of Art has removed the cream-colored paint added at a later date, and restored the original color and texture of the stucco. Photo: Courtesy MacDonald and Mack Partnership.

Revival Styles Promote Use of Stucco

The introduction of the many revival styles of architecture around the turn of the twentieth century, combined with the improvement and increased availability of portland cement resulted in a "craze" for stucco as a building material in the United States. Beginning about 1890 and gaining momentum into the 1930's and 1940's, stucco was associated with certain historic architectural styles, including: Prairie; Art Deco, and Art Moderne; Spanish Colonial, Mission, Pueblo, Mediterranean, English Cotswold Cottage, and Tudor Revival styles; as well as the ubiquitous bungalow and "four-square" house (Fig. 3). The fad for Spanish Colonial Revival, and other variations on this theme, was especially important in furthering stucco as a building material in the United States during this period, since stucco clearly looked like adobe (Fig. 4).

Although stucco buildings were especially prevalent in California, the Southwest and Florida, ostensibly because of their Spanish heritage, this period also spawned stucco-coated, revival-style buildings all over the United States and Canada. The popularity of stucco as a cheap, and readily available material meant that by the 1920's, it was used for an increasing variety of building types. Resort hotels, apartment buildings, private mansions and movie theaters, railroad stations, and even gas stations and tourist courts took advantage of the "romance" of period styles, and adopted the stucco construction that had become synonymous with these styles (Fig. 5).

Fig. 4. The elaborate Spanish Colonial Revival style of this building designed by Bertram Goodhue for the 1915 Panama California Exposition held in San Diego's Balboa Park emphasizes the sculptural possibilities of stucco. Photo: C.W. Snell, National Historic Landmark Files.

A Practical Building Material

Stucco has traditionally been popular for a variety of reasons. It was an inexpensive material that could simulate finely dressed stonework, especially when "scored" or "lined" in the European tradition. A stucco coating over a less finished and less costly substrate such as rubblestone, fieldstone, brick, log or wood frame, gave the building the appearance of being a more expensive and important structure. As a weather-repellent coating, stucco protected the building from wind and rain penetration, and also offered a certain amount of fire protection. While stucco was usually applied during construction as part of the building design, particularly over rubblestone or fieldstone, in some instances it was added later to protect the structure, or when a rise in the owner's social status demanded a comparable rise in his standard of living.

Composition of Historic Stucco

Before the mid-to-late nineteenth century, stucco consisted primarily of hydrated or slaked lime, water and sand, with straw or animal hair included as a binder. Natural cements were frequently used in stucco mixes after their discovery in the United States during the 1820's. Portland cement was first manufactured in the United States in 1871, and it gradually replaced natural cement. After about 1900, most stucco was composed primarily of portland cement, mixed with some lime. With the addition of portland cement, stucco became even more versatile and durable. No longer used just as a coating for a substantial material like masonry or log, stucco could now be applied over wood or metal lath attached to a light wood frame. With this increased strength, stucco ceased to be just a veneer and became a more integral part of the building structure.

Fig. 5. During the 19th and 20th centuries stucco has been a popular material not only for residential, but also for commercial buildings in the Spanish style. Two such examples are (a) the 1851 Ernest Hemingway House, Key West, Florida, built of stuccoed limestone in a Spanish Caribbean style; and (b) the Santa Fe Depot (Union Station), San Diego, California, designed by the architects Bakewell and Brown in 1914 in a Spanish Colonial Revival style, and constructed of stucco over brick and hollow tile. Photos: (a) J.F. Brooks, HABS Collection, (b) Marvin Rand, HABS Collection.

Today, gypsum, which is hydrated calcium sulfate or sulfate of lime, has to a great extent replaced lime. Gypsum is preferred because it hardens faster and has less shrinkage than lime. Lime is generally used only in the finish coat in contemporary stucco work.

The composition of stucco depended on local custom and available materials. Stucco often contained substantial amounts of mud or clay, marble or brick dust, or even sawdust, and an array of additives ranging from animal blood or urine, to eggs, keratin or gluesize (animal hooves and horns), varnish, wheat paste, sugar, salt, sodium silicate, alum, tallow, linseed oil, beeswax, and wine, beer, or rye whiskey. Waxes, fats and oils were included to introduce water-repellent properties, sugary materials reduced the amount of water needed and slowed down the setting time, and alcohol acted as an air entrainer. All of these additives contributed to the strength and durability of the stucco.

The appearance of much stucco was determined by the color of the sand—or sometimes burnt clay, used in the mix, but often stucco was also tinted with natural pigments, or the surface whitewashed or colorwashed after stuccoing was completed. Brick dust could provide color, and other coloring materials that were not affected by lime, mostly mineral pigments, could be added to the mix for the final finish coat. Stucco was also marbled or marbleized—stained to look like stone by diluting oil of vitriol (sulfuric acid) with water, and mixing this with a yellow ochre, or another color (Fig. 6). As the twentieth century progressed, manufactured or synthetic pigments were added at the factory to some prepared stucco mixes.

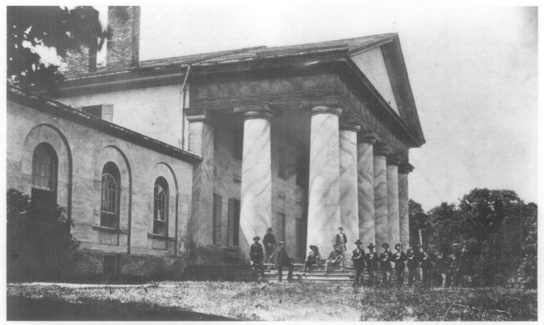

Fig. 6. Arlington House, Arlington, Virginia, was built between 1802–1818 of brick covered with stucco. It was designed by George Hadfield for George Washington Parke Custis, grandson of Martha Washington, and was later the home of Robert E. Lee. This photograph taken on June 28, 1864, by Captain Andrew J. Russell, a U.S. Signal Corps photographer, shows the stucco after it had been marbleized during the 1850's. Yellow ochre and burnt umber pigments were combined to imitate Sienna marble, and the stucco, with the exception of the roughcast foundation, was scored to heighten the illusion of stone. Photo: National Archives, Arlington House Collection, National Park Service.

Methods of Application

Stucco is applied directly, without lath, to masonry substrates such as brick, stone, concrete or hollow tile (Fig. 7). But on wood structures, stucco, like its interior counterpart plaster, must be applied over lath in order to obtain an adequate key to hold the stucco. Thus, when applied over a log structure, stucco is laid on horizontal wood lath that has been nailed on vertical wood furring strips attached to the logs (Fig. 8). If it is applied over a wood frame structure, stucco may be applied to wood or metal lath nailed directly to the wood frame; it may also be placed on lath that has been attached to furring strips. The furring strips are themselves laid over building paper covering the wood sheathing (Fig. 9). Wood lath was gradually superseded by expanded metal lath introduced in the late-nineteenth and early-twentieth century. When stuccoing over a stone or brick substrate, it was customary to cut back or rake out the mortar joints if they were not already recessed by natural weathering or erosion, and sometimes the bricks themselves were gouged to provide a key for the stucco. This helped provide the necessary bond for the stucco to remain attached to the masonry, much like the key provided by wood or metal lath on frame buildings.

Fig. 7. Patches of stucco have fallen off this derelict 19th century structure exposing the rough-cut local stone substrate. The missing wood entablature on the side and the rough wood lintel now exposed above a second-floor window, offer clues that the building was stuccoed originally. Photo: National Park Service Files.

Fig. 8. Removal of deteriorated stucco in preparation for stucco repair on this late-18th century log house in Middleway, West Virginia, reveals that the stucco was applied to hand-riven wood lath nailed over vertical wood strips attached to the logs. Photo: Anne Grimmer.

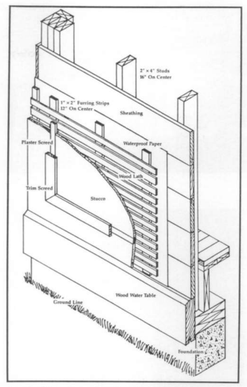

Fig. 9. This cutaway drawing shows the method of attachment for stucco commonly used on wood frame or balloon frame structures from the late-19th to the 20th century. Drawing: Brian Conway, "Illinois Preservation Series Number 2: Stucco."

Like interior wall plaster, stucco has traditionally been applied as a multiple-layer process, sometimes consisting of two coats, but more commonly as three. Whether applied directly to a masonry substrate or onto wood or metal lath, this consists of a first "scratch" or "pricking-up" coat, followed by a second scratch coat, sometimes referred to as a "floating" or "brown" coat, followed finally by the "finishing" coat. Up until the late-nineteenth century, the first and the second coats were of much the same composition, generally consisting of lime, or natural cement, sand, perhaps clay, and one or more of the additives previously mentioned. Straw or animal hair was usually added to the first coat as a binder. The third, or finishing coat, consisted primarily of a very fine mesh grade of lime and sand, and sometimes pigment. As already noted, after the 1820's, natural cement was also a common ingredient in stucco until it was replaced by portland cement.

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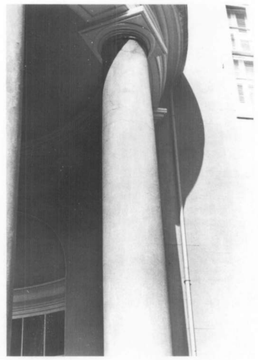

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Fig. 10. (a) Tudor Place, Washington, D.C. (1805–1816), was designed by Dr. William Thornton. Like its contemporary, Arlington House, it is stuccoed and scored, with a roughcast base, but here the stucco is a monochromatic sandstone color tinted by sand and mineral pigments (b). Although the original stucco was replaced in the early-20th century with a portland cement-based stucco, the family, who retained ownership until 1984 when the house was opened to the public, left explicit instructions for future stucco repairs. The mix recommended for repairing hairline cracks (c), consists of sharp sand, cement and lime, burnt umber, burnt sienna, and a small amount of raw sienna. Preparation of numerous test samples, the size of "a thick griddle cake," will be necessary to match the stucco color, and when the exact color has been achieved, the mixture is to be diluted to the "consistency of cream," brushed on the wall and rubbed into the cracks with a rubber sponge or float. Note the dark color visible under the eaves intended to replicate the stronger color of the original limewashed stucco (d). Photos: Anne Grimmer.

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Both masonry and wood lath must be kept wet or damp to ensure a good bond with the stucco. Wetting these materials helps to prevent them from pulling moisture out of the stucco too rapidly, which results in cracking, loss of bond, and generally poor quality stuccowork.

Traditional Stucco Finishes

Until the early-twentieth century when a variety of novelty finishes or textures were introduced, the last coat of stucco was commonly given a smooth, troweled finish, and then scored or lined in imitation of ashlar. The illusion of masonry joints was sometimes enhanced by a thin line of white lime putty, graphite, or some other pigment. Some nineteenth century buildings feature a water table or raised foundation of rough-cast stucco that differentiates it from the stucco surface above, which is smooth and scored (Fig. 10). Other novelty or textured finishes associated with the "period" or revival styles of the early-twentieth century include: the English cottage finish, adobe and Spanish, pebble-dashed or dry-dash surface, fan and sponge texture, reticulated and vermiculated, roughcast (or wet dash), and sgraffito (Fig. 11).

Repairing Deteriorated Stucco

Regular Maintenance

Although A. J. Downing alluded to stuccoed houses in Pennsylvania that had survived for over a century in relatively good condition, historic stucco is inherently not a particularly permanent or long-lasting building material. Regular maintenance is required to keep it in good condition. Unfortunately, many older or historic buildings are not always accorded this kind of care.

Because building owners knew stucco to be a protective, but also somewhat fragile coating, they employed a variety of means to prolong its usefulness. The most common treatment was to whitewash stucco, often annually. The lime in the whitewash offered protection and stability and helped to harden the stucco. Most importantly, it filled hairline cracks before they could develop into larger cracks and let in moisture. To improve water repellency, stucco buildings were also sometimes coated with paraffin, another type of wax, or other stucco-like coatings, such as oil mastics.

Assessing Damage

Most stucco deterioration is the result of water infiltration into the building structure, either through the roof, around chimneys, window and door openings, or excessive ground water or moisture penetrating through, or splashing up from the foundation. Potential causes of deterioration include: ground settlement, lintel and door frame settlement, inadequate or leaking gutters and downspouts, intrusive vegetation, moisture migration within walls due to interior condensation and humidity, vapor drive problems caused by furnace, bathroom and kitchen vents, and rising damp resulting from excessive ground water and poor drainage around the foundation. Water infiltration will cause wood lath to rot, and metal lath and nails to rust, which eventu-

Fig. 11. The Hotel Washington, Washington, D.C. (1916–1917), is notable for its decorative ***sgraffito*** *surfaces. Stucco panels under the cornice and around the windows feature classical designs created by artists who incised the patterns in the outer layer of red-colored stucco while still soft, thereby exposing a stucco undercoat of a contrasting color. Photo: Kaye Ellen Simonson.*

ally will cause stucco to lose its bond and pull away from its substrate.

After the cause of deterioration has been identified, any necessary repairs to the building should be made first before repairing the stucco. Such work is likely to include repairs designed to keep excessive water away from the stucco, such as roof, gutter, downspout and flashing repairs, improving drainage, and redirecting rainwater runoff and splash-back away from the building. Horizontal areas such as the tops of parapet walls or chimneys are particularly vulnerable to water infiltration, and may require modifications to their original design, such as the addition of flashing to correct the problem.

Previous repairs inexpertly carried out may have caused additional deterioration, particularly if executed in portland cement, which tends to be very rigid, and therefore incompatible with early, mostly soft lime-based stucco that is more "flexible." Incompatible

repairs, external vibration caused by traffic or construction, or building settlement can also result in cracks which permit the entrance of water and cause the stucco to fail (Fig. 12).

Before beginning any stucco repair, an assessment of the stucco should be undertaken to determine the extent of the damage, and how much must be replaced or repaired. Testing should be carried out systematically on all elevations of the building to determine the overall condition of the stucco. Some areas in need of repair will be clearly evidenced by missing sections of stucco or stucco layers. Bulging or cracked areas are obvious places to begin. Unsound, punky or soft areas that have lost their key will echo with a hollow sound when tapped gently with a wooden or acrylic hammer or mallet.

Identifying the Stucco Type

Analysis of the historic stucco will provide useful information on its primary ingredients and their proportions, and will help to ensure that the new replacement stucco will duplicate the old in strength, composition, color and texture as closely as possible. However, unless authentic, period restoration is required, it may not be worthwhile, nor in many instances possible, to attempt to duplicate *all* of the ingredients (particularly some of the additives), in creating the new stucco mortar. Some items are no longer available, and others, notably sand and lime—the major components of traditional stucco—have changed radically over time. For example, most sand used in contemporary masonry work is manufactured sand, because river sand, which was used historically, is difficult to obtain today in many parts of the country. The physical and visual qualities of manufactured sand versus river sand, are quite different, and this affects the way stucco works, as well as the way it looks. The same is true of lime, which is frequently replaced by gypsum in modern stucco mixes. And even if identification of all the items in the historic stucco mix were possible, the analysis would still not reveal how the original stucco was mixed and applied.

There are, however, simple tests that can be carried out on a small piece of stucco to determine its basic make-up. A dilute solution of hydrochloric (muriatic) acid will dissolve lime-based stucco, but not portland cement. Although the use of portland cement became common after 1900, there are no precise cut-off dates, as stuccoing practices varied among individual plasterers, and from region to region. Some plasterers began using portland cement in the 1880's, but others may have continued to favor lime stucco well into the early-twentieth century. While it is safe to assume that a late-eighteenth or early-nineteenth century stucco is lime-based, late-nineteenth or early-twentieth century

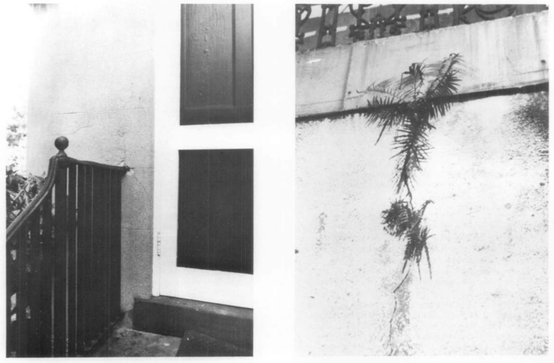

Fig. 12. (a) Water intrusion caused by rusting metal, or (b) plant growth left unattended will gradually enlarge these cracks, resulting in spalling, and eventually requiring extensive repair of the stucco. Photos: National Park Service Files.

Fig. 13. (a) In preparation for repainting, hairline cracks on this Mediterranean style stucco apartment building were filled with a commercial caulking compound; (b) dirt is attracted and adheres to the texture of the caulked areas, and a year after painting, these inappropriate repairs are highly obvious. Photos: Anne Grimmer.

stucco may be based on either lime or portland cement. Another important factor to take into consideration is that an early lime-stucco building is likely to have been repaired many times over the ensuing years, and it is probable that at least some of these patches consist of portland cement.

Planning the Repair

Once the extent of damage has been determined, a number of repair options may be considered. Small hairline cracks usually are not serious and may be sealed with a thin slurry coat consisting of the finish coat ingredients, or even with a coat of paint or whitewash. Commercially available caulking compounds are not suitable materials for patching hairline cracks. Because their consistency and texture is unlike that of stucco, they tend to weather differently, and attract more dirt; as a result, repairs made with caulking compounds may be highly visible, and unsightly (Fig. 13). Larger cracks will have to be cut out in preparation for more extensive repair. Most stucco repairs will require the skill and expertise of a professional plasterer (Fig. 14).

In the interest of saving or preserving as much as possible of the historic stucco, patching rather than wholesale replacement is preferable. When repairing heavily textured surfaces, it is not usually necessary to replace an entire wall section, as the textured finish, if well-executed, tends to conceal patches, and helps them to blend in with the existing stucco. However, because of the nature of smooth-finished stucco, patching a number of small areas scattered over one elevation may not be a successful repair approach unless the stucco has been previously painted, or is to be painted following the repair work. On unpainted stucco such patches are hard to conceal, because they may not match exactly or blend in with the rest of the historic stucco surface. For

Fig. 14. This poorly executed patch is not the work of a professional plasterer. While it may serve to keep out water, it does not match the original surface, and is not an appropriate repair for historic stucco. Photo: Betsy Chittenden.

this reason it is recommended, if possible, that stucco repair be carried out in a contained or well-defined area, or if the stucco is scored, the repair patch should be "squared-off" in such a way as to follow existing scoring. In some cases, especially in a highly visible location, it may be preferable to restucco an entire wall section or feature. In this way, any differences between the patched area and the historic surface will not be so readily apparent.

Repair of historic stucco generally follows most of the same principles used in plaster repair. First, all deteriorated, severely cracked and loose stucco should be removed down to the lath (assuming that the lath is securely attached to the substrate), or down to the masonry if the stucco is directly applied to a masonry substrate. A clean surface is necessary to obtain a good

bond between the stucco and substrate. The areas to be patched should be cleaned of all debris with a bristle brush, and all plant growth, dirt, loose paint, oil or grease should be removed (Fig. 15). If necessary, brick or stone mortar joints should then be raked out to a depth of approximately 5/8" to ensure a good bond between the substrate and the new stucco.

To obtain a neat repair, the area to be patched should be squared-off with a butt joint, using a cold chisel, a hatchet, a diamond blade saw, or a masonry bit. Sometimes it may be preferable to leave the area to be patched in an irregular shape which may result in a less conspicuous patch. Proper preparation of the area to be patched requires very sharp tools, and extreme caution on the part of the plasterer not to break keys of surrounding good stucco by "over-sounding" when removing deteriorated stucco. To ensure a firm bond, the new patch must not overlap the old stucco. If the stucco has lost its bond or key from wood lath, or the lath has deteriorated or come loose from the substrate, a decision must be made whether to try to reattach the old lath, to replace deteriorated lath with new wood lath, or to leave the historic wood lath in place and supplement it with modern expanded metal lath. Unless authenticity is important, it is generally preferable (and easier) to nail new metal lath over the old wood lath to support the patch. Metal lath that is no longer securely fastened to the substrate may be removed and replaced in kind, or left in place, and supplemented with new wire lath.

When repairing lime-based stucco applied directly to masonry, the new stucco should be applied in the same manner, directly onto the stone or brick. The stucco will bond onto the masonry itself without the addition of lath because of the irregularities in the masonry or those of its mortar joints, or because its surface has been scratched, scored or otherwise roughened to provide an additional key. Cutting out the old stucco at a diagonal angle may also help secure the bond between the new and the old stucco. For the most part it is not advisable to insert metal lath when restuccoing historic masonry in sound condition, as it can hasten deterioration of the repair work. Not only will attaching the lath damage the masonry, but the slightest moisture penetration can cause metal lath to rust. This will cause metal to expand, eventually resulting in spalling of the stucco, and possibly the masonry substrate too.

If the area to be patched is properly cleaned and prepared, a bonding agent is usually not necessary. However, a bonding agent may be useful when repairing hairline cracks, or when dealing with substrates that do not offer a good bonding surface. These may include dense stone or brick, previously painted or stuccoed

Fig. 15. (a) After reattaching any loose wood lath to the furring strips underneath, the area to be patched has been cleaned, the lath thoroughly wetted, and (b) the first coat of stucco has been applied and scratched to provide a key to hold the second layer of stucco. Photos: Betsy Chittenden.

masonry, or spalling brick substrates. A good mechanical bond is always preferable to reliance on bonding agents. Bonding agents should not be used on a wall that is likely to remain damp or where large amounts of salts are present. Many bonding agents do not survive well under such conditions, and their use could jeopardize the longevity of the stucco repair.

A stucco mix compatible with the historic stucco should be selected after analyzing the existing stucco. It can be adapted from a standard traditional mix of the period, or based on one of the mixes included here. Stucco consisting mostly of portland cement generally will not be physically compatible with the softer, more flexible lime-rich historic stuccos used throughout the eighteenth and much of the nineteenth centuries. The differing expansion and contraction rates of lime stucco and portland cement stucco will normally cause the stucco to crack. Choosing a stucco mix that is durable and compatible with the historic stucco on the building is likely to involve considerable trial and error, and probably will require a number of test samples, and even more if it is necessary to match the color. It is best to let the stucco test samples weather as long as possible—ideally one year, or at least through a change of seasons, in order to study the durability of the mix and its compatibility with the existing stucco, as well as the weathering of the tint if the building will not be painted and color match is an important factor. If the test samples are not executed on the building, they should be placed next to the stucco remaining on the building to compare the color, texture and composition of the samples with the original. The number and thickness of stucco coats used in the repair should also match the original.

After thoroughly dampening the masonry or wood lath, the first, scratch coat should be applied to the masonry substrate, or wood or metal lath, in a thickness that corresponds to the original if extant, or generally about 1/4" to 3/8". The scratch coat should be scratched or cross-hatched with a comb to provide a key to hold the second coat. It usually takes 24-72 hours, and longer in cold weather, for each coat to dry before the next coat can be applied. The second coat should be about the same thickness as the first, and the total thickness of the first two coats should generally not exceed about 5/8". This second or leveling coat should be roughened using a wood float with a nail protruding to provide a key for the final or finish coat. The finish coat, about 1/4" thick, is applied after the previous coat has initially set. If this is not feasible, the base coat should be thoroughly dampened when the finish coat is applied later. The finish coat should be worked to match the texture of the original stucco (Fig. 16).

Colors and Tints for Historic Stucco Repair

The color of most early stucco was supplied by the aggregate included in the mix—usually the sand. Sometimes natural pigments were added to the mix, and eighteenth and nineteenth-century scored stucco was often marbleized or painted in imitation of marble or granite. Stucco was also frequently coated with whitewash or a colorwash. This tradition later evolved into the use of paint, its popularity depending on the vagaries of fashion as much as a means of concealing repairs. Because most of the early colors were derived from nature, the resultant stucco tints tended to be mostly earth-toned. This was true until the advent of brightly colored stucco in the early decades of the twentieth century. This was the so-called "Jazz Plaster" developed by O.A. Malone, the "man who put color into California," and who founded the California Stucco Products Corporation in 1927. California Stucco was revolutionary for its time as the first stucco/plaster to contain colored pigment in its pre-packaged factory mix.

When patching or repairing a historic stucco surface known to have been tinted, it may be possible to determine through visual or microscopic analysis whether the source of the coloring is sand, cement or pigment. Although some pigments or aggregates used traditionally may no longer be available, a sufficiently close color-match can generally be approximated using sand, natural or mineral pigments, or a combination of these. Obtaining such a match will require testing and comparing the color of dried test samples with the original. Successfully combining pigments in the dry stucco mix prepared for the finish coat requires considerable skill. The amount of pigment must be carefully measured for each batch of stucco. Overworking the mix can make the pigment separate from the lime. Changing the amount of water added to the mix, or using water to apply the tinted finish coat, will also affect the color of the stucco when it dries.

Generally, the color obtained by hand-mixing these ingredients will provide a sufficiently close match to cover an entire wall or an area distinct enough from the rest of the structure that the color differences will not be obvious. However, it may not work for small patches conspicuously located on a primary elevation, where color differences will be especially noticeable. In these instances, it may be necessary to conceal the repairs by painting the entire patched elevation, or even the whole building.

Many stucco buildings have been painted over the years and will require repainting after the stucco repairs have been made. Limewash or cement-based paint, latex paint, or oil-based paint are appropriate coatings for stucco buildings. The most important factor to consider when repainting a previously painted or coated surface is that the new paint be compatible with any coating already on the surface. In preparation for repainting, all loose or peeling paint or other coating material not firmly adhered to the stucco must be removed by hand-scraping or natural bristle brushes. The surface should then be cleaned.

Cement-based paints, most of which today contain some portland cement and are really a type of limewash, have traditionally been used on stucco buildings. The ingredients were easily obtainable. Furthermore, the lime in such paints actually bonded or joined with the stucco and provided a very durable coating. In many regions, whitewash was applied annually during spring cleaning. Modern, commercially available premixed masonry and mineral-based paints may also be used on historic stucco buildings.

Fig. A

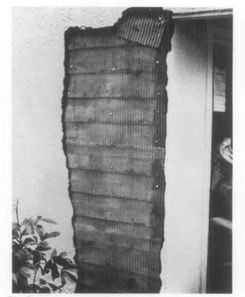

Fig. B

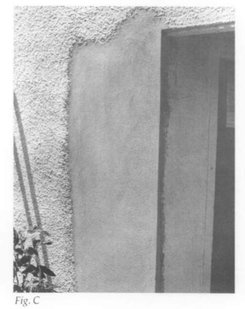

Fig. C

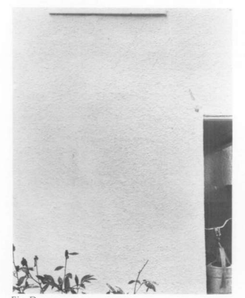

Fig. D

Fig. 16. (a) In preparation for stucco repair, this plasterer is mixing the dry materials in a mortar box with a mortar hoe (note the 2 holes in the blade), pulling it through the box using short choppy strokes. After the dry materials are thoroughly combined, water is added and mixed with them using the same choppy, but gradually lengthening stokes, making sure that the hoe cuts completely through the mix to the bottom of the box. (b) The deteriorated stucco has been cut away, and new metal lath has been nailed to the clapboarding in the area to be patched. (Although originally clapboarded when built in the 19th century, the house was stuccoed around the turn-of-the-century on metal lath nailed over the clapboard.) (c) The first, scratch coat and the second coat have been applied here, and await the spatterdash or rough-cast finish of the final coat (d) which was accomplished by the plasterer using a whisk broom to throw the stucco mortar against the wall surface. This well-executed patch is barely discernable, and lacks only a coat of paint to make it blend completely with the rest of the painted wall surface. Photos: Anne Grimmer.

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If the structure must be painted for the first time to conceal repairs, almost any of these coatings may be acceptable depending on the situation. Latex paint, for example, may be applied to slightly damp walls or where there is an excess of moisture, but latex paint will not stick to chalky or powdery areas. Oil-based, or alkyd paints must be applied only to dry walls; new stucco must cure up to a year before it can be painted with oil-based paint.

Contemporary Stucco Products

There are many contemporary stucco products on the market today. Many of them are not compatible, either physically or visually, with historic stucco buildings. Such products should be considered for use only after consulting with a historic masonry specialist. However, some of these prepackaged tinted stucco coatings may be suitable for use on stucco buildings dating from the late-nineteenth or early-twentieth century, as long as the color and texture are appropriate for the period and style of the building. While some masonry contractors may, as a matter of course, suggest that a water-repellent coating be applied after repairing old stucco, in most cases this should not be necessary, since color-washes and paints serve the same purpose, and stucco itself is a protective coating.

Cleaning Historic Stucco Surfaces

Historic stucco buildings often exhibit multiple layers of paint or limewash. Although some stucco surfaces may be cleaned by water washing, the relative success of this procedure depends on two factors: the surface texture of the stucco, and the type of dirt to be removed. If simply removing airborne dirt, **smooth unpainted stucco,** and **heavily-textured painted stucco** may sometimes be cleaned using a low-pressure water wash, supplemented by scrubbing with soft natural bristle brushes, and possibly non-ionic detergents. Organic plant material, such as algae and mold, and metallic stains may be removed from stucco using poultices and appropriate solvents. Although these same methods may be employed to clean **unpainted rough-cast, pebble-dash, or any stucco surface featuring exposed aggregate,** due to the surface irregularities, it may be difficult to remove dirt, without also removing portions of the decorative textured surface. Difficulty in cleaning these surfaces may explain why so many of these textured surfaces have been painted.

When Total Replacement is Necessary

Complete replacement of the historic stucco with new stucco of either a traditional or modern mix will probably be necessary only in cases of extreme deterioration—that is, a loss of bond on over 40–50 per cent of the stucco surface. Another reason for total removal might be that the physical and visual integrity of the historic stucco has been so compromised by prior incompatible and ill-conceived repairs that patching would not be successful.

When stucco no longer exists on a building there is more flexibility in choosing a suitable mix for the replacement. Since compatibility of old and new stucco will not be an issue, the most important factors to consider are durability, color, texture and finish. Depending on the construction and substrate of the building, in some instances it may be acceptable to use a relatively strong cement-based stucco mortar. This is certainly true for many late-nineteenth and early-twentieth century buildings, and may even be appropriate to use on some stone substrates even if the original mortar would have been weaker, as long as the historic visual qualities noted above have been replicated. Generally, the best principle to follow for a masonry building is that the stucco mix, whether for repair or replacement of historic stucco, should be somewhat weaker than the masonry to which it is to be applied in order not to damage the substrate.

General Guidance for Historic Stucco Repair

A skilled professional plasterer will be familiar with the properties of materials involved in stucco repair and will be able to avoid some of the pitfalls that would hinder someone less experienced. General suggestions for successful stucco repair parallel those involving restoration and repair of historic mortar or plaster. In addition, the following principles are important to remember:

- Mix only as much stucco as can be used in one and one-half to two hours. This will depend on the weather (mortar will harden faster under hot and dry, or sunny conditions); and experience is likely to be the best guidance. Any remaining mortar should be discarded; it should not be retempered.
- Stucco mortar should not be over-mixed. (Hand mix for 10–15 minutes after adding water, or machine mix for 3–4 minutes after all ingredients are in mixer.) Over-mixing can cause crazing and discoloration, especially in tinted mortars. Over-mixing will also tend to make the mortar set too fast, which will result in cracking and poor bonding or keying to the lath or masonry substrate.
- Wood lath or a masonry substrate, but not metal lath, must be thoroughly wetted before applying stucco patches so that it does not draw moisture out of the stucco too rapidly. To a certain extent, bonding agents also serve this same purpose. Wetting the substrate helps retard drying.
- To prevent cracking, it is imperative that stucco not dry too fast. Therefore, the area to be stuccoed should be shaded, or even covered if possible, particularly in hot weather. It is also a good idea in hot weather to keep the newly stuccoed area damp, at approximately 90 per cent humidity, for a period of 48 to 72 hours.
- Stucco repairs, like most other exterior masonry work, should not be undertaken in cold weather (below 40 degrees fahrenheit, and preferably warmer), or if there is danger of frost.

Historic Stucco Textures

Most of the oldest stucco in the U.S. dating prior to the late-nineteenth century, will generally have a **smooth, troweled finish** (sometimes called a **sand** or **float finish**), possibly scored to resemble ashlar masonry units. Scoring may be incised to simulate masonry joints, the scored lines may be emphasized by black or white penciling, or the lines may simply be drawn or painted on the surface of the stucco. In some regions, at least as early as the first decades of the nineteenth century, it was not uncommon to use a **roughcast finish** on the foundation or base of an otherwise **smooth-surfaced** building (Fig. a). **Roughcast** was also used as an overall stucco finish for some outbuildings, and other less important types of structures.

A wide variety of decorative surface textures may be found on revival style stucco buildings, particularly residential architecture. These styles evolved in the late-nineteenth century and peaked in popularity in the early decades of the twentieth century. Frank Lloyd Wright favored a **smooth finish** stucco, which was imitated on much of the Prairie style architecture inspired by his work. Some of the more picturesque surface textures include: **English Cottage** or **English Cotswold finish**; **sponge finish** (Fig. b); **fan texture**; **adobe finish** (Fig. c), and **Spanish** or **Italian finish.** Many of these finishes and countless other regional and personalized variations on them are still in use.

The most common early-twentieth century stucco finishes are often found on bungalow-style houses, and include: **spatter** or **spatterdash** (sometimes called **roughcast, harling,** or **wetdash**), and **pebble-dash** or **drydash.** The **spatterdash** finish is applied by throwing the stucco mortar against the wall using a whisk broom or a stiff fiber brush, and it requires considerable skill on the part of the plasterer to achieve a consistently rough wall surface. The mortar used to obtain this texture is usually composed simply of a regular sand, lime, and cement mortar, although it may sometimes contain small **pebbles** or crushed stone aggregate, which replaces one-half the normal sand content. The **pebbledash** or **drydash finish** is accomplished manually by the plasterer throwing or "dashing" dry pebbles (about 1/8" to 1/4" in size), onto a coat of stucco freshly applied by another plasterer. The pebbles must be thrown at the wall with a scoop with sufficient force and skill that they will stick to the stuccoed wall. A more even or uniform surface can be achieved by patting the stones down with a wooden float. This finish may also be created using a texturing machine (Figs. d–f illustrate 3 versions of this finish. Photos: National Park Service Files).


Fig. A


Fig. B


Fig. C


Fig. D


Fig. E

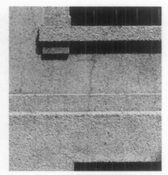
Fig. F

Summary

Stucco on historic buildings is especially vulnerable not only to the wear of time and exposure to the elements, but also at the hands of well-intentioned "restorers," who may want to remove stucco from eighteenth and nineteenth century structures, to expose what they believe to be the original or more "historic" brick, stone or log underneath. Historic stucco is a character-defining feature and should be considered an important historic building material, significant in its own right. While many eighteenth and nineteenth century buildings were stuccoed at the time of construction, others were stuccoed later for reasons of fashion or practicality. As such, it is likely that this stucco has acquired significance over time, as part of the history and evolution of a building. Thus, even later, non-historic stucco should be retained in most instances; and similar logic dictates that new stucco should not be applied to a historic building that was not stuccoed previously. When repairing historic stucco, the new stucco should duplicate the old as closely as possible in strength, composition, color and texture.

Mixes for Repair of Historic Stucco

Historic stucco mixes varied a great deal regionally, depending as they did on the availability of local materials. There are probably almost as many mixes that can be used for repair of historic stucco as there are historic stucco buildings. For this reason it is recommended that at least a rudimentary analysis of the existing historic stucco be carried out in order to determine its general proportions and primary ingredients. However, if this is not possible, or if test results are inconclusive, the following mixes are provided as reference. Many of the publications listed under "Selected Reading" include a variety of stucco mixes and should also be consulted for additional guidance.

Materials Specifications should conform to those contained in *Preservation Briefs 2: Repointing Mortar Joints in Historic Brick Buildings,* and are as follows:

- Lime should conform to ASTM C–207, Type S, Hydrated Lime for Masonry Purposes.
- Sand should conform to ASTM C–144 to assure proper gradation and freedom from impurities. Sand, or other type of aggregate, should match the original as closely as possible.
- Cement should conform to ASTM C–150, Type II (white, non-staining), portland cement.
- Water should be fresh, clean and potable.
- If hair or fiber is used, it should be goat or cattle hair, or pure manilla fiber of good quality, 1/2" to 2" in length, clean, and free of dust, dirt, oil, grease or other impurities.
- Rules to remember: More lime will make the mixture more plastic, but stucco mortar with a very large proportion of lime to sand is more likely to crack because of greater shrinkage; it is also weaker and slower to set. More sand or aggregate, will minimize shrinkage, but make the mixture harder to trowel smooth, and will weaken the mortar.

Soft Lime Stucco (suitable for application to buildings dating from 1700–1850)

A.J. Downing's Recipe for Soft Lime Stucco
1 part lime
2 parts sand
(A.J. Downing, "The Architecture of Country Houses," 1850)

Vieux Carre Masonry Maintenance Guidelines
Base Coats (2):
1 part by volume hydrated lime
3 parts by volume aggregate [sand]—size to match original
6 pounds/cubic yards hair or fiber
Water to form a workable mix.
Finish Coat:
1 part by volume hydrated lime
3 parts aggregate [sand]—size to match original
Water to form a workable mix.
Note: No portland cement is recommended in this mix, but if it is needed to increase the workability of the mix and to decrease the setting time, the amount of portland cement added should never exceed 1 part to 12 parts lime and sand.
("Vieux Carre Masonry Maintenance Guidelines," June, 1980.)

"Materials for Soft Brick Mortar and for Soft Stucco"
5 gallons hydrated lime
10 gallons sand
1 quart white, non-staining portland cement (1 cup only for pointing)
Water to form a workable mix.
(Koch and Wilson, Architects, New Orleans, Louisiana, February, 1980)

Mix for Repair of Traditional Natural Cement or Hydraulic Lime Stucco
1 part by volume hydrated lime
2 parts by volume white portland cement
3 parts by volume fine mason's sand
If hydraulic lime is available, it may be used instead of lime-cement blends.
("Conservation Techniques for the Repair of Historical Ornamental Exterior Stucco, January, 1980)

Early-twentieth century Portland Cement Stucco
1 part portland cement
2 1/2 parts sand
Hydrated lime = to not more than 15% of the cement's volume
Water to form a workable mix.
The same basic mix was used for all coats, but the finish coat generally contained more lime than the undercoats. ("Illinois Preservation Series No. 2: Stucco," January, 1980)

American Portland Cement Stucco Specifications (c. 1929)
Base Coats:
5 pounds, dry, hydrated lime
1 bag portland cement (94 lbs.)
Not less than 3 cubic feet (3 bags) sand (passed through a #8 screen)
Water to make a workable mix.
Finish Coat:
Use WHITE portland cement in the mix in the same proportions as above.
To color the stucco add not more than 10 pounds pigment for each bag of cement contained in the mix.

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This publication has been prepared pursuant to the National Historic Preservation Act of 1966, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Comments on the usefulness of this publication may be directed to H. Ward Jandl, Chief, Technical Preservation Services Branch, Preservation Assistance Division, National Park Service, P.O. Box 37127, Washington, D.C. 20013–7127. This publication is not copyrighted and can be reproduced without penalty. Normal procedures for credit to the author and the National Park Service are appreciated.

October 1990

Cover Photograph: St. James Church, Goose Creek, Berkeley County, South Carolina (1713–1719), is constructed of brick covered with stucco. Although much restored, it is notable for its ornamental stucco detailing, including rusticated quoins, cherub head "keystones" above the windows, flaming hearts, and a pelican in piety—symbol of the sacrament, in the pediment over the front door. Photo: Gary Hume.

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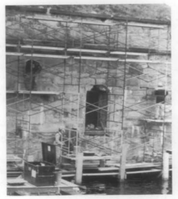

Holding the Line: Controlling Unwanted Moisture in Historic Buildings

Sharon C. Park, AIA

U.S. Department of the Interior
National Park Service
Cultural Resources
Heritage Preservation Services

Uncontrolled moisture is the most prevalent cause of deterioration in older and historic buildings. It leads to erosion, corrosion, rot, and ultimately the destruction of materials, finishes, and eventually structural components. Ever-present in our environment, moisture can be *controlled* to provide the differing *levels* of moisture necessary for human comfort as well as the longevity of historic building materials, furnishings, and museum collections. The challenge to building owners and preservation professionals alike is to understand the patterns of moisture movement in order to better manage it — not to eliminate it. There is never a single answer to a moisture problem. Diagnosis and treatment will always differ depending on where the building is located, climatic and soil conditions, ground water effects, and local traditions in building construction.

Remedial Actions within an Historic Preservation Context

In this Brief, advice about controlling the sources of unwanted moisture is provided within a preservation context based on philosophical principles contained in the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Following the Standards means significant materials and features that contribute to the historic character of the building should be preserved, not damaged during remedial treatment (see fig.1). It also means that physical treatments should be reversible, whenever possible. The majority of treatments for moisture management in this Brief stress preservation maintenance for materials, effective drainage of troublesome ground moisture, and improved interior ventilation.

The Brief encourages a systematic approach for evaluating moisture problems which, in some cases, can be undertaken by a building owner. Because the source of moisture can be elusive, it may be necessary to consult with historic preservation professionals prior to starting work that would affect historic materials. Architects, engineers, conservators, preservation contractors, and staff of State Historic Preservation Offices (SHPOs) can provide such advice.

Regardless of who does the work, however, these are the principles that should guide treatment decisions:

- Avoid remedial treatments without prior careful diagnosis.
- Undertake treatments that protect the historical significance of the resource.
- Address issues of ground-related moisture and rain run-off thoroughly.
- Manage existing moisture conditions before introducing humidified/dehumidified mechanical systems.
- Implement a program of ongoing monitoring and maintenance once moisture is controlled or managed.
- Be aware of significant landscape and archeological resources in areas to be excavated.

Finally, mitigating the effects of catastrophic moisture, such as floods, requires a different approach and will not be addressed fully in this Brief.

Fig. 1. Moisture problems, if not properly corrected, will increase damage to historic buildings. This waterproof coating trapped moisture from the leaking roof, causing portions of the masonry parapet to fail. Photo: NPS Files.

How and Where to Look for Damaging Moisture

Finding, treating, and managing the sources of damaging moisture requires a systematic approach that takes time, patience, and a thorough examination of all aspects of the problem—including a series of variable conditions (See this page). Moisture problems may be a direct result of one of these factors or may be attributable to a combination of interdependent variables.

Factors Contributing to Moisture Problems

A variety of simultaneously existing conditions contribute to moisture problems in old buildings. For recurring moisture problems, it may be necessary for the owner or preservation professional to address many, if not all, of the following variables:

- Types of building materials and construction systems
- Type and condition of roof and site drainage systems and their rates of discharge
- Type of soil, moisture content, and surface /subsurface water flow adjacent to building
- Building usage and moisture generated by occupancy
- Condition and absorption rates of materials
- Type, operation, and condition of heating, ventilating, cooling, humidification/ dehumidification, and plumbing systems
- Daily and seasonal changes in sun, prevailing winds, rain, temperature, and relative humidity (inside and outside), as well as seasonal or tidal variations in groundwater levels
- Unusual site conditions or irregularities of construction
- Conditions in affected wall cavities, temperature and relative humidity, and dewpoints
- Amount of air infiltration present in a building
- Adjacent landscape and planting materials

Diagnosing and treating the cause of moisture problems requires looking at both the localized decay, as well as understanding the performance of the entire building and site. Moisture is notorious for traveling far from the source, and moisture movement within concealed areas of the building construction make accurate diagnosis of the source and path difficult. Obvious deficiencies, such as broken pipes, clogged gutters, or cracked walls that contribute to moisture damage, should always be corrected promptly.

For more complicated problems, it may take several months or up to four seasons of monitoring and evaluation to complete a full diagnosis. Rushing to a solution without adequate documentation can often result in the unnecessary removal of historic materials—and worse—the creation of long-term problems associated with an increase, rather than a decrease, in the unwanted moisture.

Looking for Signs

Identifying the type of moisture damage and discovering its source or sources usually involves the human senses of sight, smell, hearing, touch, and taste combined with intuition. Some of the more common signs of visible as well as hidden moisture damage (see fig. 2, 3) include:

- Presence of standing water, mold, fungus, or mildew
- Wet stains, eroding surfaces, or efflorescence (salt deposits) on interior and exterior surfaces
- Flaking paint and plaster, peeling wallpaper, or moisture blisters on finished surfaces
- Dank, musty smells in areas of high humidity or poorly ventilated spaces
- Rust and corrosion stains on metal elements, such as anchorage systems and protruding roof nails in the attic
- Cupped, warped, cracked, or rotted wood
- Spalled, cracked masonry or eroded mortar joints
- Faulty roofs and gutters including missing roofing slates, tiles, or shingles and poor condition of flashing or gutters
- Condensation on window and wall surfaces
- Ice dams in gutters, on roofs, or moisture in attics

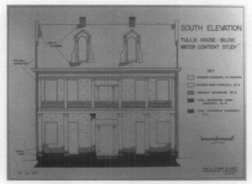

Fig. 2. Historic buildings plagued by dampness problems will benefit from systematic documentation to set a baseline against which moisture changes can be measured. Exterior areas with higher moisture levels may have algae growth or discoloration stains. Drawing: John H. Stubbs.

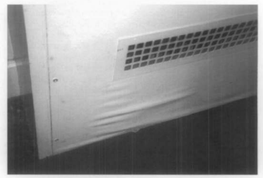

Fig. 3. The deterioration of this wooden cover was a sign that water was leaking from the fan coil unit behind. Photo: author.

Uncovering and Analyzing Moisture Problems

Moisture comes from a variety of external sources. Most problems begin as a result of the weather in the form of rain or snow, from high ambient relative humidity, or from high water tables. But some of the most troublesome moisture damage in older buildings may be from internal sources, such as leaking plumbing pipes, components of heating, cooling, and climate control systems, as well as sources related to use or occupancy of the building. In some cases, moisture damage may be the result of poorly designed original details, such as projecting outriggers in rustic structures that are vulnerable to rotting, and may require special treatment.

The five most common sources of unwanted moisture include:

- Above grade exterior moisture entering the building
- Below grade ground moisture entering the building
- Leaking plumbing pipes and mechanical equipment
- Interior moisture from household use and climate control systems
- Water used in maintenance and construction materials.

Above grade exterior moisture generally results from weather related moisture entering through deteriorating materials as a result of deferred maintenance, structural settlement cracks, or damage from high winds or storms (see fig. 4). Such sources as faulty roofs, cracks in walls, and open joints around window and door openings can be corrected through either repair or limited replacement. Due to their age, historic buildings are notoriously "drafty," allowing rain, wind, and damp air to enter through missing mortar joints; around cracks in windows, doors, and wood siding; and into uninsulated attics. In some cases, excessively absorbent materials, such as soft sandstone, become saturated from rain or gutter overflows, and can allow moisture to dampen interior surfaces. Vines or other vegetative materials allowed to grow directly on building materials without trellis or other framework can cause damage from roots eroding mortar joints and foundations as well as dampness being held against surfaces. In most cases, keeping vegetation off buildings, repairing damaged materials, replacing flashings, rehanging gutters, repairing downspouts, repointing mortar, caulking perimeter joints around windows and doors, and repainting surfaces can alleviate most sources of unwanted exterior moisture from entering a building above grade.

Below grade ground moisture is a major source of unwanted moisture for historic and older buildings. *Proper handling of surface rain run-off is one of the most important measures of controlling unwanted ground moisture.* Rain water is often referred to as "bulk moisture" in areas that receive significant annual rainfalls or infrequent, but heavy, precipitation. For example, a heavy rain of 2" per hour can produce 200 gallons of water from downspout discharge alone for a house during a one hour period. When soil is saturated at the base of the building, the moisture will wet footings and crawl spaces or find its way through cracks in foundation walls and enter into basements (see fig. 5). Moisture in saturated basement or foundation walls—also exacerbated by high water tables—will generally rise up within a wall and eventually cause deterioration of the masonry and adjacent wooden structural elements.

Builders traditionally left a working area, known as a builder's trench, around the exterior of a foundation wall. These trenches have been known to increase moisture problems if the infill soil is less than fully compacted or includes rubble backfill, which, in some cases, may act as a reservoir holding damp materials against masonry walls. Broken subsurface pipes or downspout drainage can leak into the builder's trench and dampen walls some distance from the source. Any subsurface penetration of the foundation wall for sewer, water, or other piping also can act as a direct conduit of ground moisture unless these holes are well sealed. A frequently unsuspected, but serious, modern source of ground moisture is a landscape irrigation system set too close to the building. Incorrect placement of sprinkler heads can add a tremendous amount of moisture at the foundation level and on wall surfaces.

Fig. 4. Deferred maintenance often leads to blocked gutters and downspouts. This cracked gutter system allowed moisture to penetrate the upper exterior wall, erode mortar joints, and rot fascia boards. Photo: NPS files.

Fig. 5. Excavating this foundation revealed that the downspout pipe had corroded at the "u-trap" and was leaking moisture into the soil. Openings around the horizontal water supply line and cracks in the wall allowed moisture to penetrate the basement in multiple locations. Photo: author.

The ground, and subsequently the building, will stay much drier by 1) re-directing rain water away from the foundation through sloping grades, 2) capturing and disposing downspout water well away from the building, 3) developing a controlled ground gutter or effective drainage for buildings historically without gutters and downspouts, and 4) reducing splash-back of moisture onto foundation walls. The excavation of foundations and the use of dampproof coatings and footing drains should only be used after the measures of reducing ground moisture listed above have been implemented.

Leaking plumbing pipes and mechanical equipment can cause immediate or long-term damage to historic building interiors. Routine maintenance, repair, or, if necessary, replacement of older plumbing and mechanical equipment are common solutions. Older water and sewer pipes are subject to corrosion over time. Slow leaks at plumbing joints hidden within walls and ceilings can ultimately rot floor boards, stain ceiling plaster, and lead to decay of structural members. Frozen pipes that crack can damage interior finishes (see fig. 6). In addition to leaking plumbing pipes, old radiators in some historic buildings have been replaced with water-supplied fan coil units which tend to leak. These heating and cooling units, as well as central air equipment, have overflow and condensation pans that require cyclical maintenance to avoid mold and mildew growth and corrosion blockage of drainage channels. Uninsulated forced-air sheet metal ductwork and cold water pipes in walls and ceilings often allow condensation to form on the cold metal, which then drips and causes bubbling plaster and peeling paint. Careful design and vigilant maintenance, as well as repair and insulating pipes or ductwork, will generally rid the building of these common sources of moisture.

Fig. 6. Uninsulated plumbing pipes close to the exterior wall froze and cracked, wetting this ornamental plaster ceiling before the water supply line could be shut off. As a result, limited portions of the ceiling needed reattaching. Photo: author.

Interior moisture from building use and modern humidified heating and cooling systems can create serious problems. In northern U.S. climates, heated buildings will have winter-time relative humidity levels ranging from 10%-35% Relative Humidity (RH). A house with four occupants generates between 10 and 16 pounds of water a day (approximately 1 – 2 gallons) from human residents. Moisture from food preparation, showering, or laundry use will produce condensation on windows in winter climates.

When one area or floor of a building is air-conditioned and another area is not, there is the chance for condensation to occur between the two areas. Most periodic condensation does not create a long-term problem.

Humidified climate control systems are generally a major problem in museums housed within historic buildings. They produce between 35%-55% RH on average which, as a vapor, will seek to dissipate and equalize with adjacent spaces (see fig. 7). Moisture can form on single-glazed windows in winter with exterior temperatures below 30 F and interior temperatures at 70 F with as little as 35% RH. Frequent condensation on interior window surfaces is an indication that moisture is migrating into exterior walls, which can cause long-term damage to historic materials. Materials and wall systems around climate controlled areas may need to be made of moisture resistant finishes in order to handle the additional moisture in the air. Moist interior conditions in hot and humid climates will generate mold and fungal growth. Unvented mechanical equipment, such as gas stoves, driers, and kerosene heaters, generate large quantities of moisture. It is important to provide adequate ventilation and find a balance between interior temperature, relative humidity, and airflow to avoid interior moisture that can damage historic buildings.

Fig. 7. Condensation dripping from the large overhead courtyard skylight was damaging the masonry in this museum. A new skylight with thermal glazing was installed, replacing the deteriorated single-glazed unit. A new climate control system monitors interior temperature and humidity. Photo: © Isabella Stewart Gardner Museum, Boston.

Moisture from maintenance and construction materials can cause damage to adjacent historic materials. Careless use of liquids to wash floors can lead to water seepage through cracks and dislodge adhesives or cup and curl materials. High-pressure power washing of exterior walls and roofing materials can force water into construction joints where it can dislodge mortar, lift roofing tiles, and saturate frame walls and masonry. Replastered or newly

plastered interior walls or the construction of new additions attached to historic buildings may hold moisture for months; new plaster, mortar, or concrete should be fully cured before they are painted or finished. The use of materials in projects that have been damaged by moisture prior to installation or have too high a moisture content may cause concealed damage (see fig. 8).

Fig. 8. Damaging moisture conditions can occur during construction. Peeling paint on this newly rehabilitated frame wall was attributed to wall insulation that had become wet during the project and was not discovered. Photo: NPS Files.

Transport or Movement of Moisture

Knowing the five most common sources of moisture that cause damage to building materials is the first step in diagnosing moisture problems. But it is also important to understand the basic mechanisms that affect moisture movement in buildings. Moisture transport, or movement, occurs in two states: liquid and vapor. It is directly related to pressure differentials. For example, water in a gaseous or vapor state, as warm moist air, will move from its high pressure area to a lower pressure area where the air is cooler and drier. Liquid water will move as a result of differences in hydrostatic pressure or wind pressure. *It is the pressure differentials that drive the rate of moisture migration in either state.* Because the building materials themselves resist this moisture movement, the rate of movement will depend on two factors: the permeability of the materials when affected by vapor and the absorption rates of materials in contact with liquid.

The mechanics, or physics, of moisture movement is complex, but if the driving force is difference in pressure, then an approach to reducing moisture movement and its damage is to reduce the difference in pressure, not to increase it. That is why the treatments discussed in this Brief will look at *managing moisture by draining bulk moisture and ventilating vapor moisture* before setting up new barriers with impermeable coatings or over-pressurized new climate control systems that threaten aging building materials and archaic construction systems.

Three forms of moisture transport are particularly important to understand in regards to historic buildings — *infiltration, capillary action, and vapor diffusion* —remembering, at the same time, that the subject is infinitely complex and, thus, one of continuing scientific study (see fig. 9). Buildings were traditionally designed to deal with the movement of air. For example, cupolas and roof lanterns allowed hot air to rise and provided a natural draft to pull air through buildings. Cavity walls in both frame and masonry buildings were constructed to allow moisture to dissipate in the air space between external and internal walls. Radiators were placed in front of windows to keep cold surfaces warm, thereby reducing condensation on these surfaces. Many of these features, however, have been altered over time in an effort to modernize appearances, improve energy efficiency, or accommodate changes in use. The change in use will also affect moisture movement, particularly in commercial and industrial buildings with modern mechanical systems. Therefore, the way a building handles air and moisture today may be different from that intended by the original builder or architect, and poorly conceived changes may be partially responsible for chronic moisture conditions.

Moisture moves into and through materials as both a visible liquid (capillary action) and as a gaseous vapor (infiltration and vapor diffusion). Moisture from leaks, saturation, rising damp, and condensation can lead to the deterioration of materials and cause an unhealthy environment. Moisture in its solid form, ice, can also cause damage from frozen, cracked water pipes, or split gutter seams or spalled masonry from freeze-thaw action. Moisture from melting ice dams, leaks, and condensation often can travel great distances down walls and along construction surfaces, pipes, or conduits. The amount of moisture and how it deteriorates materials is dependent upon complex forces and variables that must be considered for each situation.

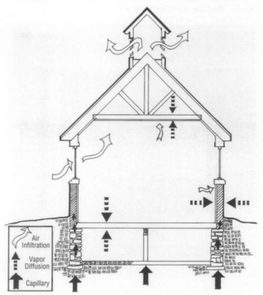

Fig. 9. The dynamic forces that move air and moisture through a building are important to understand particularly when selecting a treatment to correct a moisture problem. Air infiltration, capillary action, and vapor diffusion all affect the wetting and drying of materials. Drawing: NPS Files.

Determining the way moisture is handled by the building is further complicated because each building and site is unique. Water damage from blocked gutters and downspouts can saturate materials on the outside, and high levels of interior moisture can saturate interior materials. Difficult cases may call for technical evaluation by consultants specializing in moisture monitoring and diagnostic evaluation. In other words, it may take a team to effectively evaluate a situation and determine a proper approach to controlling moisture damage in old buildings.

Infiltration is created by wind, temperature gradients (hot air rising), ventilation fan action, and the stack or chimney effect that draws air up into tall vertical spaces. Infiltration as a dynamic force does not actually move liquid water, but is the vehicle by which dampness, as a component of air, finds its way into building materials. Older buildings have a natural air exchange, generally from 1 to 4 changes per hour, which, in turn, may help control moisture by diluting moisture within a building. The tighter the building construction, however, the lower will be the infiltration rate and the natural circulation of air. In the process of infiltration, however, moisture that has entered the building and saturated materials can be drawn in and out of materials, thereby adding to the dampness in the air (see fig. 10). Inadequate air circulation where there is excessive moisture (i.e., in a damp basement), accelerates the deterioration of historic materials. To reduce the unwanted moisture that accompanies infiltration, it is best to incorporate maintenance and repair treatments to close joints and weatherstrip windows, while providing controlled air exchanges elsewhere. The worst approach is to seal the building so completely, while limiting fresh air intake, that the building cannot breathe.

Fig. 10. Infiltration of damp air can occur around loose-fitting or deteriorated window sash and through cracks or open joints in building exteriors. Photo: Ann Brooks Prueher.

Capillary action occurs when moisture in saturated porous building materials, such as masonry, wicks up or travels vertically as it evaporates to the surface. In capillary attraction, liquid in the material is attracted to the solid surface of the pore structure causing it to rise vertically; thus, it is often called "rising damp," particularly when found in conjunction with ground moisture. It should not, however, be confused with moisture that laterally penetrates a foundation wall through cracks and settles in the basement. Not easily controlled, most rising damp comes from high water tables or a constant source under the footing. In cases of damp masonry walls with capillary action, there is usually a whitish stain or horizontal tide mark of efflorescence that seasonally fluctuates about 1–3 feet above grade where the excess moisture evaporates from the wall (see fig. 11). This tide mark is full of salt crystals, that have been drawn from the ground and building materials along with the water, making the masonry even more sensitive to additional moisture absorption from the surrounding air. Capillary migration of moisture may occur in any material with a pore structure where there is a constant or recurring source of moisture.

Fig. 11. Capillary rise of moisture in masonry is often accompanied with a horizontal tide-mark line several feet above the grade, as seen here. Removing or redirecting as much ground moisture as possible usually helps reduce moisture within a wall. Photo: NPS Files.

The best approach for dealing with capillary rise in building materials is to reduce the amount of water in contact with historic materials. If that is not possible due to chronically high water tables, it may be necessary to introduce a horizontal damp-proof barrier, such as slate course or a lead or plastic sheet, to stop the vertical rise of moisture. Moisture should not be sealed into the wall with a waterproof coating, such as cement parging or vinyl wall coverings, applied to the inside of damp walls. This will only increase the pressure differential as a vertical barrier and force the capillary action, and its destruction of materials, higher up the wall.

Vapor diffusion is the natural movement of pressurized moisture vapor through porous materials. It is most readily apparent as humidified interior air moves out through walls to a cooler exterior. In a hot and humid climate, the reverse will happen as moist hot air moves into cooler, dryer, air-conditioned, interiors. The movement of the moisture vapor is not a serious problem until the dewpoint temperature is reached and the vapor changes into liquid moisture known as *condensation*. This can occur within a wall or on interior surfaces. Vapor diffusion will be more of

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HG - MOISTURE CONTROL

Construction Document Set

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a problem for a frame structure with several layers of infill materials within the frame cavity than a dense masonry structure. Condensation as a result of vapor migration usually takes place on a surface or film, such as paint, where there is a change in permeability.

The installation of climate control systems in historic buildings (mostly museums) that have *not* been properly designed or regulated and that force pressurized damp air to diffuse into perimeter walls is an ongoing concern. These newer systems take constant monitoring and back-up warning systems to avoid moisture damage.

Long-term and undetected condensation or high moisture content can cause serious structural damage as well as an unhealthy environment, heavy with mold and mildew spores. Reducing the interior/exterior pressure differential and the difference between interior and exterior temperature and relative humidity helps control unwanted vapor diffusion. This can sometimes be achieved by reducing interior relative humidity. In some instances, using vapor barriers, such as heavy plastic sheeting laid over damp crawl spaces, can have remarkable success in stopping vapor diffusion from damp ground into buildings. Yet, knowledgeable experts in the field differ regarding the appropriateness of vapor barriers and when and where to use them, as well as the best way to handle natural diffusion in insulated walls.

Adding insulation to historic buildings, particularly in walls of wooden frame structures, has been a standard modern weatherization treatment, but it can have a disastrous effect on historic buildings. The process of installing the insulation destroys historic siding or plaster, and it is very difficult to establish a tight vapor barrier. While insulation has the benefit of increasing the efficiency of heating and cooling by containing temperature controlled air, it does not eliminate surfaces on which damaging moisture can condense. For insulated residential frame structures, the most obvious sign of a moisture

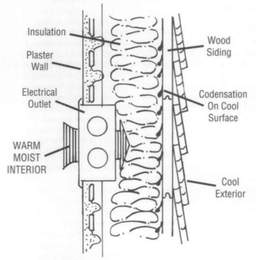

Fig. 12. Vapor diffusion can result in damp air migrating into absorbent materials and condensing on colder surfaces, thereby wetting insulation, damaging electrical conduits, and causing deterioration of the wooden framing. Drawing: NPS Files.

diffusion problem is peeling paint on wooden siding, even after careful surface preparation and repainting. Vapor impermeable barriers such as plastic sheeting, or more accurately, *vapor retarders*, in cold and moderate climates generally help slow vapor diffusion where it is not wanted.

In regions where *humidified* climate control systems are installed into insulated frame buildings, it is important to stop *interstitial*, or in-wall, dewpoint condensation. This is very difficult because humidified air can penetrate breaches in the vapor barrier, particularly around electrical outlets (see fig. 12). Improperly or incompletely installed retrofit vapor barriers will cause extensive damage to the building, just in the installation process, and will allow trapped condensation to wet the insulation and sheathing boards, corrode metal elements such as wiring cables and metal anchors, and blister paint finishes. Providing a tight wall vapor barrier, as well as a ventilated cavity behind wooden clapboards or siding appears to help insulated frame walls, if the interior relative humidity can be adjusted or monitored to avoid condensation. Correct placement of vapor retarders within building construction will vary by region, building construction, and type of climate control system.

Surveying and Diagnosing Moisture Damage: Key Questions to Ask

It is important for the building to be surveyed first and the evidence and location of suspected moisture damage systematically recorded before undertaking any major work to correct the problem. This will give a baseline from which relative changes in condition can be noted.

When materials become wet, there are specific physical changes that can be detected and noted in a record book or on survey sheets. Every time there is a heavy rain, snow storm, water in the basement, or mechanical systems failure, the owner or consultant should note and record the way moisture is moving, its appearance, and what variables might contribute to the cause. *Standing outside to observe a building in the rain may answer many questions and help trace the movement of water into the building.* Evidence of deteriorating materials that cover more serious moisture damage should also be noted, even if it is not immediately clear what is causing the damage. (For example, water stains on the ceiling may be from leaking pipes, blocked fan coil drainage pans above, or from moisture which has penetrated around a poorly sloped window sill above.) Don't jump to conclusions, but use a systematic approach to help establish an educated theory — or hypothesis — of what is causing the moisture problem or what areas need further investigation.

Surveying moisture damage must be systematic so that relative changes can be noted. Tools for investigating can be as simple as a notebook, sketch plans, binoculars, camera, aluminum foil, smoke pencil, and flashlight. The systematic approach involves looking at buildings from the top down and from the outside to the inside. Photographs, floor plans, site plan, and exterior elevations — even roughly sketched — should be used to indicate all evidence of damp or damaged materials, with notations for musty or poorly ventilated areas. Information might be needed on the absorption and permeability characteristics of the building materials and soils. Exterior drainage patterns should be noted and these base plans referred to on a regular basis in different seasons and in differing types of weather (see fig. 13).

Glossary:

Air flow/ infiltration: The movement that carries moist air into and through materials. Air flow depends on the difference between indoor and outdoor pressures, wind speed and direction as well as the permeability of materials.

Bulk water: The large quantity of moisture from roof and ground run-off that can enter into a building either above grade or below grade.

Capillary action: The force that moves moisture through the pore structure of materials. Generally referred to as rising damp, moisture at or below the foundation level will rise vertically in a wall to a height at which the rate of evaporation balances the rate at which it can be drawn up by capillary forces.

Condensation: The physical process by which water vapor is transformed into a liquid when the relative humidity of the air reaches 100% and the excess water vapor forms, generally as droplets, on the colder adjacent surface.

Convection: Heat transfer through the atmosphere by a difference in force or air pressure is one type of air transport. Sometimes referred to as the "stack effect," hotter less dense air will rise, colder dense air will fall creating movement of air within a building.

Dewpoint: The temperature at which water vapor condenses when the air is cooled at a constant pressure and constant moisture content.

Diffusion: The movement of water vapor through a material. Diffusion depends on vapor pressure, temperature, relative humidity, and the permeability of a material.

Evaporation: The transformation of liquid into a vapor, generally as a result of rise of temperature, is the opposite of condensation. Moisture in damp soil, such as in a crawl space, can evaporate into the air, raise the relative humidity in that space, and enter the building as a vapor.

Ground moisture: The saturated moisture in the ground as a result of surface run-off and naturally occuring water tables. Ground moisture can penetrate through cracks and holes in foundation walls or can migrate up from moisture under the foundation base.

Monitoring instrumentation: These devices are generally used for long term diagnostic analysis of a problem, or to measure the preformance of a treatment, or to measure changes of conditions in the environment. In-wall probes or sensors are often attached to data-loggers which can be down-loaded into computers.

Permeability: A characteristic of porosity of a material generally listed as the rate of diffusion of a pressurized gas through a material. The pore structure of some materials allows them to absorb or adsorb more moisture than other materials. Limestones are generally more permeable than granites.

Relative humidity (RH): Dampness in the air is measured as the percent of water vapor in the air at a specific temperature relative to the amount of water vapor that can be held in a vapor form at that specific temperature.

Survey instrumentation: technical instrumentation that is used on-site to provide quick readings of specific physical conditions. Generally these are hand-held survey instruments, such as moisture, temperature and relative humidity readers, dewpoint sensors, and fiber optic boroscopes.

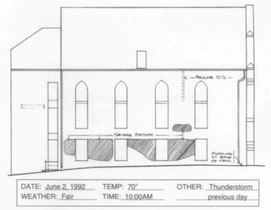

Fig. 13. Using sketch plans and elevation drawings to record the moisture damage along with the date, time, and weather conditions will show how moisture is affecting buildings over time. Drawing: Courtesy, Quinn Evans Architects.

It is best to start with one method of periodic documentation and to use this same method each time. Because moisture is affected by gravity, many surveys start with the roof and guttering systems and work down through the exterior walls. Any obvious areas of water penetration, damaged surfaces, or staining should be noted. Any recurring damp or stain patterns, both exterior and interior, should also be noted with a commentary on the temperature, weather, and any other facts that may be relevant (driving rains, saturated soil, high interior humidity, recent washing of the building, presence of a lawn watering system, etc.).

The interior should be recorded as well, beginning with the attic and working down to the basement and crawl space. It may be necessary to remove damaged materials selectively in order to trace the path of moisture or to pinpoint a source, such as a leaking pipe in the ceiling. The use of a basic resistance moisture meter, available in many hardware stores, can identify moisture contents of materials and show, over time, if wall surfaces are drying or becoming damper (see fig. 14). A smoke pencil can chart air infiltration around windows or draft patterns in interior spaces. For a quick test to determine if a damp basement is caused by saturated walls or is a result of condensation, tape a piece of foil onto a masonry surface and check it after a day or two; if moisture has developed behind the foil, then it is coming from the masonry. If condensation is on the surface of the foil, then moisture is from the air.

Comparing current conditions with previous conditions, historic drawings, photographs, or known alterations may also assist in the final diagnosis. A chronological record, showing improvement or deterioration, should be backed up with photographs or notations as to the changing size, condition, or features of the deterioration and how these changes have been affected by variables of temperature and rainfall. If a condition can be related in time to a particular event, such as efflorescence developing on a chimney after the building is no longer heated, it may be possible to isolate a cause, develop a hypothesis, and then test the hypothesis (by adding some temporary heat), before applying a remedial treatment.

Fig. 14. Using instruments in this damp-check kit can help determine the relative change in wet conditions over time. This involves readings of air temperature, computing dewpoint temperatures, and tracking the moisture content of materials to indicate if they are drying properly. Photo: Dell Corporation.

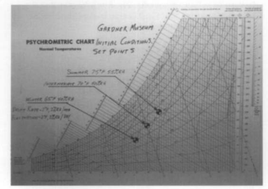

Fig. 15. Psychrometric charts quantify the amount of relative humidity a building can tolerate before dewpoint condensation occurs. This is important when the range of temperature and humidity are critical to both collections management and historic building preservation. Chart: Landmark Facilities Group.

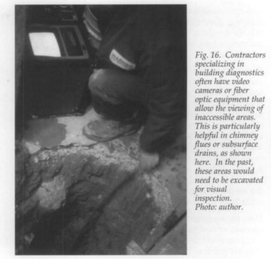

Fig. 16. Contractors specializing in building diagnostics often have video cameras or fiber optic equipment that allow the viewing of inaccessible areas. This is particularly helpful in chimney flues or subsurface drains, as shown here. In the past, these areas would need to be excavated for visual inspection. Photo: author.

If the owner or consultant has access to moisture survey and monitoring equipment such as resistance moisture meters, dewpoint indicators, salt detectors, infrared thermography systems, psychrometer, fiber-optic boroscopes, and miniaturized video cameras, additional quantified data can be incorporated into the survey (see fig. 15). If it is necessary to track the wetting and drying of walls over a period of time, deep probes set into walls and in the soil with connector cables to computerized data loggers or the use of long-term recording of hygrothermographs may require a trained specialist. Miniaturized fiber-optic video cameras can record the condition of subsurface drain lines without excavation (see fig. 16). It should be noted, however, that *instrumentation, while extremely useful, cannot take the place of careful personal observation and analysis.* Relying on instrumentation alone rarely will give the owner the information needed to fully diagnose a moisture problem.

To avoid jumping to a quick—potentially erroneous—conclusion, a series of questions should be asked first. This will help establish a theory or hypothesis that can be tested to increase the chances that a remedial treatment will control or manage existing moisture.

How is water draining around building and site? What is the effectiveness of gutters and downspouts? Are the slopes or grading around foundations adequate? What are the locations of subsurface features such as wells, cisterns, or drainage fields? Are there subsurface drainage pipes (or drainage boots) attached to the downspouts and are they in good working condition? Does the soil retain moisture or allow it to drain freely? Where is the water table? Are there window wells holding rain water? What is the flow rate of area drains around the site (can be tested with a hose for several minutes)? Is the storm piping out to the street sufficient for heavy rains, or does water chronically back up on the site? Has adjacent new construction affected site drainage or water table levels?

How does water/moisture appear to be entering the building? Have all five primary sources of moisture been evaluated? What is the condition of construction materials and are there any obvious areas of deterioration? Did this building have a builder's trench around the foundation that could be holding water against the exterior walls? Are the interior bearing walls as well as the exterior walls showing evidence of rising damp? Is there evidence of hydrostatic pressure under the basement floor such as water percolating up through cracks? Has there been moisture damage from an ice dam in the last several months? Is damage localized, on one side of the building only, or over a large area?

What are the principal moisture dynamics? Is the moisture condition from liquid or vapor sources? Is the attic moisture a result of vapor diffusion as damp air comes up through the cavity walls from the crawl space or is it from a leaking roof? Is the exterior wall moisture from rising damp with a tide mark or are there uneven spots of dampness from foundation splash back, or other ground

moisture conditions? Is there adequate air exchange in the building, particularly in damp areas, such as the basement? Has the height of the water table been established by inserting a long pipe into the ground in order to record the water levels?

How is the interior climate handling moisture? Are there areas in the building that do not appear to be ventilating well and where mold is growing? Are there historic features that once helped the building control air and moisture that can be reactivated, such as operable skylights or windows? Could dewpoint condensation be occurring behind surfaces, since there is often condensation on the windows? Does the building feel unusually damp or smell in an unusual way that suggest the need for further study? Is there evidence of termites, carpenter ants, or other pests attracted to moist conditions? Is a dehumidifier keeping the air dry or is it, in fact, creating a cycle where it is actually drawing moisture through the foundation wall?

Does the moisture problem appear to be intermittent, chronic, or tied to specific events? Are damp conditions occuring within two hours of a heavy rain or is there a delayed reaction? Does rust on most nail heads in the attic indicate a condensation problem? What are the wet patterns that appear on a building wall during and after a rain storm? Is it localized or in large areas? Can these rain patterns be tied to gutter over-flows, faulty flashing, or saturation of absorbent materials? Is a repaired area holding up well over time or is there evidence that moisture is returning? Do moisture meter readings of wall cavities indicate they are wet, suggesting leaks or condensation in the wall?

Once a hypothesis of the source or sources of the moisture has been developed from observation and recording of data, it is often useful to prove or disprove this hypothesis with interim treatments, and, if necessary, the additional use of instrumentation to verify conditions. For damp basements, test solutions can help determine the cause. For example, surface moisture in low spots should be redirected away from the foundation wall with regrading to determine if basement dampness improves. If there is still a problem, determine if subsurface downspout collection pipes or cast iron boots are not functioning properly. The above grade downspouts can be disconnected and attached to long, flexible extender pipes and redirected away from the foundation (see fig. 17). If, after a heavy rain or a simulation using a hose, there is no improvement, look for additional ground moisture sources such as high water tables, hidden cisterns, or leaking water service lines as a cause of moisture in the basement. New data will lead to a new hypothesis that should be tested and verified. *The process of elimination can be frustrating, but is required if a systematic method of diagnosis is to be successful.*

Selecting an Appropriate Level of Treatment

The treatments in chart format at the back of this publication are divided into levels based on the degree of moisture problems. Level I covers preservation maintenance; Level II focuses on repair using historically compatible materials and essentially mitigating damaging moisture conditions; and Level III discusses replacement and alteration of materials that permit continued use in a chronically moist environment. It is important to begin

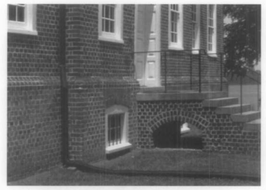

Fig. 17. In testing a theory for the cause of basement wetness, the owner used long black extender pipes to direct roof run-off away from the foundation. This test established that the owner did not need expensive waterproofing of the foundation, but a better drainage system. Photo: Baird M. Smith.

with Level I and work through to a manageable treatment as part of the control of moisture problems. Buildings in serious decay will require treatments in Level II, and difficult or unusual site conditions may require more aggressive treatments in Level III. Caution should always be exercised when selecting a treatment. The treatments listed are a guide and not intended to be recommendations for specific projects as the key is always proper diagnosis.

Start with the repair of any obvious deficiencies using sound preservation maintenance. If moisture cannot be managed by maintenance alone, it is important to reduce it by mitigating problems *before* deteriorated historic materials are replaced (see fig. 18). Treatments should not remove materials that can be preserved; should not involve extensive excavation unless there is a documented need; and should not include coating buildings with waterproof sealers that can exacerbate an existing problem. Some alteration to historic materials, structural systems, mechanical systems, windows, or finishes may be needed when excessive site moisture cannot be controlled by drainage systems, or in areas prone to floods. These changes, however, should, be sensitive to preserving those materials, features, and finishes that convey the historic character of the building and site.

Ongoing Care

Once the building has been repaired and the larger moisture issues addressed, it is important to keep a record of additional evidence of moisture problems and *to protect the historic or old building through proper cyclical maintenance* (see fig. 19) In some cases, particularly in museum environments, it is critical to monitor areas vulnerable to moisture damage. In a number of historic buildings, in-wall moisture monitors are used to ensure that the moisture purposely generated to keep relative humidity at ranges appropriate to a museum collection does not migrate into walls and cause deterioration. The potential problem with all systems is the failure of controls, valves, and panels over time. Back-up systems, warning devices, properly trained staff and an emergency plan will help control damage if there is a system failure.

Fig. 18. This detail drawing shows a sub-surface perimeter drain in conjunction with a historic brick ground gutter system to help control roof run-off moisture from entering the historic foundation. Detail: Courtesy, Cunston Hall Plantation. Photo: Elizabeth Sasser.

Fig. 19. Maintaining gutters and downspouts in good operable condition, repairing exteriors to keep water out, redirecting damaging moisture away from foundations and controlling interior moisture and condensation are all important when holding the line on moisture deterioration. Photo: Nebraska State Historical Society.

Ongoing maintenance and vigilance to situations that could potentially cause moisture damage must become a routine part of the everyday life of a building. The owner or staff responsible for the upkeep of the building should inspect the property weekly and note any leaks, mustiness, or blocked drains. Again, observing the building during a rain will test whether ground and gutter drainage are working well.

For some buildings a back-up power system may be necessary to keep sump pumps working during storms when electrical power may be lost. For mechanical equipment rooms, condensation pans, basement floors, and laundry areas where early detection of water is important, there are alarms that sound when their sensors come into contact with moisture.

Conclusion

Moisture in old and historic buildings, though difficult to evaluate, can be systematically studied and the appropriate protective measures taken. Much of the documentation and evaluation is based on common sense combined with an understanding of historic building materials, construction technology, and the basics of moisture and air movement. Variables can be evaluated step by step and situations creating direct or secondary moisture damage can generally be corrected. The majority of moisture problems can be mitigated with maintenance, repair, control of ground and roof moisture, and improved ventilation. For more complex situations, however, a thorough diagnosis and an understanding of how the building handles moisture at present, can lead to a treatment that solves the problem without damaging the historic resource.

It is usually advantageous to eliminate one potential source of moisture at a time. Simultaneous treatments may set up a new dynamic in the building with its own set of moisture problems. Implementing changes sequentially will allow the owner or preservation professional to track the success of each treatment.

Moisture problems can be intimidating to a building owner who has diligently tried to control them. Keeping a record of evidence of moisture damage, results of diagnostic tests, and remedial treatments, is beneficial to a building's long-term care. The more complete a survey and evaluation, the greater the success in controlling unwanted moisture now and in the future.

Holding the line on unwanted moisture in buildings will be successful if 1) there is constant concern for signs of problems and 2) there is ongoing physical care provided by those who understand the building, site, mechanical systems, and the previous efforts to deal with moisture. For properties with major or difficult-to-diagnose problems, a team approach is often most effective. The owner working with properly trained staff, contractors and consultants can monitor, select, and implement treatments within a preservation context in order to manage moisture and to protect the historic resource.

MOISTURE: LEVEL I PRESERVATION MAINTENANCE

Exterior: Apply cyclical maintenance procedures to eliminate rain and moisture infiltration.

Roofing/ guttering: Make weather-tight and operational; inspect and clean gutters as necessary depending on number of nearby trees, but at least twice a year; inspect roofing at least once a year, preferably spring; replace missing or damaged roofing shingles, slates, or tiles; repair flashing; repair or replace cracked downspouts.

Walls: Repair damaged surface materials; repoint masonry with appropriately formulated mortar; prime and repaint wooden, metal, or masonry elements or surfaces; remove efflorescence from masonry with non-metallic bristle brushes.

Window and door openings: Eliminate cracks or open joints; caulk or repoint around openings or steps; repair or reset weatherstripping; check flashing; repaint, as necessary.

A. Inspecting the overall building on at least an annual basis will identify areas needing maintenance. A bucket lift is helpful for large buildings. Photo: author.

Ground: Apply regular maintenance procedures to eliminate standing water and vegetative threats to building/site.

Grade: Eliminate low spots around building foundations; clean out existing downspout boots twice a year or add extension to leaders to carry moisture away from foundation; do a hose test to verify that surface drains are functioning; reduce moisture used to clean steps and walks; eliminate the use of chlorides to melt ice which can increase freeze/ thaw spalling of masonry; check operation of irrigation systems, hose bib leaks, and clearance of air conditioning condensate drain outlets.

Crawl space: Check crawl space for animal infestation, termites, ponding moisture, or high moisture content; check foundation grilles for adequate ventilation; seasonally close grilles when appropriate — in winter, if not needed, or in summer if hot humid air is diffusing into air conditioned space.

Foliage: Keep foliage and vines off buildings; trim overhanging trees to keep debris from gutters and limbs from rubbing against building; remove moisture retaining elements, such as firewood, from foundations.

B. Repair exterior surfaces, paint, and recaulk as needed. Photo: Williamsport Preservation Training Center (WPTC), NPS.

C. Cleaning out gutters and downspouts should be done at least twice a year. Photo: WPTC, NPS.

Basements and foundations: Increase ventilation and maintain surfaces to avoid moisture.

Equipment: Check dehumidifiers, sump pump, vent fans, and water detection or alarm systems for proper maintenance as required; check battery back-up twice a year.

Piping/ductwork: Check for condensation on pipes and insulate/seal joints, if necessary.

Interior: Maintain equipment to reduce leaks and interior moisture.

Plumbing pipes: Add insulation to plumbing or radiator pipes located in areas subject to freezing, such as along outside walls, in attics, or in unheated basements.

Mechanical equipment: Check condensation pans and drain lines to keep clear; insulate and seal joints in exposed metal ductwork to avoid drawing in moist air.

Cleaning: Routinely dust and clean surfaces to reduce the amount of water or moist chemicals used to clean building; caulk around tile floor and wall connections; and maintain floor grouts in good condition.

Ventilation: Reduce household-produced moisture, if a problem, by increasing ventilation; vent clothes driers to the outside; install and always use exhaust fans in restrooms, bathrooms, showers, and kitchens, when in use.

D. Protect the building from damage by maintaining equipment and using alarms, like this floor water sensor. Photo: Dell Corporation.

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MOISTURE: LEVEL II REPAIR AND CORRECTIVE ACTION

Exterior: Repair features that have been damaged. Replace an extensively deteriorated feature with a new feature that matches in design, color, texture, and where possible, materials.

Roofing: Repair roofing, parapets and overhangs that have allowed moisture to enter; add ice and water shield membrane to lower 3-4 feet or roofing in cold climates to limit damage from ice dams; increase attic ventilation, if heat and humidity build-up is a problem. Make gutters slope @ 1/8" to the foot. Use professional handbooks to size gutters and reposition, if necessary and appropriate to historic architecture. Add ventilated chimney caps to unused chimneys that collect rain water.

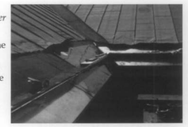
Walls: Repair spalled masonry, terra cotta, etc. by selectively installing new masonry units to match; replace rotted clapboards too close to grade and adjust grade or clapboards to achieve adequate clearance; protect or cover open window wells.

A. Mitigate poor drainage with gravel, filter cloth, or the use of subsurface drainage mats under finished paving. Photo: Larry D. Dermody.

Ground: Correct serious ground water problems; capture and dispose of downspout water away from foundation; and control vapor diffusion of crawlspace moisture.

Grade: Re-establish positive sloping of grade; try to obtain 6" of fall in the first 10' surrounding building foundation; for buildings without gutter systems, regrade and install a positive subsurface collection system with gravel, or waterproof sheeting and perimeter drains; adjust pitch or slope of eave line grade drains or French drains to reduce splash back onto foundation walls; add subsurface drainage boots or extension pipes to take existing downspout water away from building foundation to the greatest extent feasible.

Crawl space: Add polyethylene vapor barrier (heavy construction grade or Mylar) to exposed dirt in crawlspace if monitoring indicates it is needed and there is no rising damp; add ventilation grilles for additional cross ventilation, if determined advisable.



B. Repair roofs and add ice and water shields at eaves and under valleys in cold climates. Photo: Larry D. Dermody.

Foundations and Basements: Correct existing high moisture levels, if other means of controlling ground moisture are inadequate.

Mechanical devices: Add interior perimeter drains and sump pump; add dehumidifiers for seasonal control of humidity in confined, unventilated space (but don't create a problem with pulling dampness out of walls); add ventilator fans to improve air flow, but don't use both the dehumidifier and ventilator fan at the same time.

Walls: Remove commentates coatings, if holding rising damp in walls; coat walls with vapor permeable lime based rendering plaster, if damp walls need a sacrificial coating to protect mortar from erosion; add termite shields, if evidence of termites and dampness cannot be controlled.

Framing: Reinforce existing floor framing weakened by moisture by adding lolly column support and reinforcing joist ends with sistered or parallel supports. Add a vapor impermeable shield, preferably non-ferrous metal, under wood joists coming into contact with moist masonry.

C. Develop new drainage systems for roof run-off that remove moisture from the base of the building. Photo: WPTC, NPS.

Interior: Eliminate areas where moisture is leaking or causing a problem.

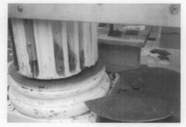
Plumbing: Replace older pipes and fixtures subject to leaking or overflowing; insulate water pipes subject to condensation.

Ventilation: Add exhaust fans and whole house fans to increase air flow through buildings, if areas are damp or need more ventilation to control mold and mildew.

Climate: Adjust temperature and relative humidity to manage interior humidity; Correct areas of improperly balanced pressure for HVAC systems that may be causing a moisture problem.

D. Install ventilating fans when additional air circulation will improve damp conditions in buildings or reduce cooling loads. Photo: Ernest A. Conrad, P. E.

MOISTURE: LEVEL III REPLACEMENT / ALTERATIONS — —



A. This lead sheet was installed at the base of the replacement column to stop rising damp. Photo: Bryan Blundell.

Exterior: Undertake exterior rehabilitation work that follows professional repair practices —i.e., replace a deteriorated feature with a new feature to match the existing in design, color, texture, and when possible, materials. In some limited situations, non-historic materials may be necessary in unusually wet areas.

Roofs: Add ventilator fans to exhaust roofs but avoid large projecting features whose designs might negatively affect the appearance of the historic roof. When replacing roofs, correct conditions that have caused moisture problems, but keep the overall appearance of the roof; for example, ventilate under wooden shingles, or detail standing seams to avoid buckling and cracking. Be attentive to provide extra protection for internal or built-in gutters by using the best quality materials, flashing, and vapor impermeable connection details.

Walls: If insulation and vapor barriers are added to frame walls, consider maintaining a ventilation channel behind the exterior cladding to avoid peeling and blistering paint occurrences.

Windows: Consider removable exterior storm windows, but allow operation of windows for periodic ventilation of cavity between exterior storm and historic sash. For stained glass windows using protective glazing, use only ventilated storms to avoid condensation as well as heat build-up.

B. Wood sills set on grade were replaced with concrete pier foundation and new wooden sill plates. Changes were not visible on the exterior (see C). Photo: WPTC, NPS.

Ground: Control excessive ground moisture. This may require extensive excavations, new drainage systems, and the use of substitute materials. These may include concrete or new sustainable recycled materials for wood in damp areas when they do not impact the historic appearance of the building.

Grade: Excavate and install water collection systems to assist with positive run-off of low lying or difficult areas of moisture drainage; use drainage mats under finished grade to improve run-off control; consider the use of column plinth blocks or bases that are ventilated or constructed of non-absorbent substitute materials in chronically damp areas. Replace improperly sloped walks; repair non-functioning catch basins and site drains; repair settled areas around steps and other features at grade.

C. The new ground gutter gravel base helps drainage around the concrete foundation (see B above) which is not visible behind the replaced wooden wall shingles. Photo: WPTC, NPS.

D. In a flood plain, rotted joists were replaced with a concrete slab and sleepers designed to drain water. Spaced flooring allowed drainage and room for damp wood to swell without buckling. Harper's Ferry Center, NPS.

E. Mechanical systems on the lower level were placed on platforms above the flood line. Harper's Ferry Center, NPS.

— — FOR CHRONICALLY DAMP CONDITIONS

Foundations: Improve performance of foundation walls with damp-proof treatments to stop infiltration or damp course layers to stop rising damp. Some substitute materials may need to be selectively integrated into new features.

Walls: excavate, repoint masonry walls, add footing drains, and waterproof exterior subsurface walls; replace wood sill plates and deteriorated structural foundations with new materials, such as pressure treated wood, to withstand chronic moisture conditions; materials may change, but overall appearance should remain similar. Add dampcourse layer to stop rising damp; avoid chemical injections as these are rarely totally effective, are not reversible, and are often visually intrusive.

Interior: Control the amount of moisture and condensation on the interiors of historic buildings. Most designs for new HVAC systems will be undertaken by mechanical engineers, but systems should be selected that are appropriate to the resource and intended use.

Windows, skylights: Add double and triple glazing, where necessary to control condensation. Avoid new metal sashes or use thermal breaks where prone to heavy condensation.

Mechanical systems: Design new systems to reduce stress on building exterior. This might require insulating and tightening up the building exterior, but provisions must be made for adequate air flow. A new zoned system, with appropriate transition insulation, may be effective in areas with differing climatic needs.

Control devices/Interior spaces: If new climate control systems are added design back-up controls and monitoring systems to protect from interior moisture damage.

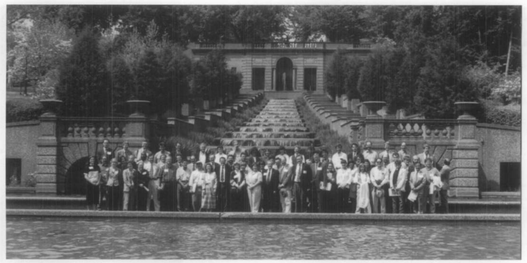
Walls: If partition walls sit on floors that periodically flood, consider spacers or isolation membranes behind baseboards to stop moisture from wicking up through absorbent materials.

I. Critically damp foundation walls were protected with a layer of bentonite clay to reduce moisture penetration. This work was in combination with new downspouts that were connected to drainage boots that deposited captures roof run-off away from the foundation. Photo: Courtesy, Larry D. Dermody and the National Trust for Historic Preservation.

F. Triple glazed windows replaced the originals to control condensation. Photo: © Isabella Stewart Gardner Museum, Boston.

G. New sensors which monitor temperature and relative humidity are located throughout this museum and tied to a computer that controls the climate control system. Photo: © Isabella Stewart Gardner Museum, Boston.

H. New computers tie a variety of monitoring and security features into a comprehensive system which provides warning and backup alerts when any of the system components are not functioning properly. Photo: © Isabella Stewart Gardner Museum, Boston.



Back Cover: The Diagnosing Moisture in Historic Building Symposium held in Washington, DC, May, 1996, brought together practitioners in the field of historic preservation to discuss the issues contained in this Preservation Brief. Attendees are standing in front of the cascading fountains at Meridian Hill Park, a National Historic Landmark. Photo: Eric Avner.

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Cover Photo: Masonry repointing in a wet environment. Photo: Williamsport Preservation Training Center, NPS.

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39 PRESERVATION BRIEFS

Holding the Line: Controlling Unwanted Moisture in Historic Buildings

Sharon C. Park, AIA

U.S. Department of the Interior
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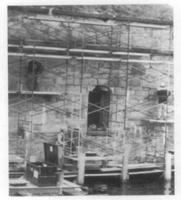

Uncontrolled moisture is the most prevalent cause of deterioration in older and historic buildings. It leads to erosion, corrosion, rot, and ultimately the destruction of materials, finishes, and eventually structural components. Ever-present in our environment, moisture can be *controlled* to provide the differing *levels* of moisture necessary for human comfort as well as the longevity of historic building materials, furnishings, and museum collections. The challenge to building owners and preservation professionals alike is to understand the patterns of moisture movement in order to better manage it — not to eliminate it. There is never a single answer to a moisture problem. Diagnosis and treatment will always differ depending on where the building is located, climatic and soil conditions, ground water effects, and local traditions in building construction.

Remedial Actions within an Historic Preservation Context

In this Brief, advice about controlling the sources of unwanted moisture is provided within a preservation context based on philosophical principles contained in the *Secretary of the Interior's Standards for the Treatment of Historic Properties*. Following the Standards means significant materials and features that contribute to the historic character of the building should be preserved, not damaged during remedial treatment (see fig.1). It also means that physical treatments should be reversible, whenever possible. The majority of treatments for moisture management in this Brief stress preservation maintenance for materials, effective drainage of troublesome ground moisture, and improved interior ventilation.

The Brief encourages a systematic approach for evaluating moisture problems which, in some cases, can be undertaken by a building owner. Because the source of moisture can be elusive, it may be necessary to consult with historic preservation professionals prior to starting work that would affect historic materials. Architects, engineers, conservators, preservation contractors, and staff of State Historic Preservation Offices (SHPOs) can provide such advice.

Regardless of who does the work, however, these are the principles that should guide treatment decisions:

- Avoid remedial treatments without prior careful diagnosis.
- Undertake treatments that protect the historical significance of the resource.
- Address issues of ground-related moisture and rain run-off thoroughly.
- Manage existing moisture conditions before introducing humidified/dehumidified mechanical systems.
- Implement a program of ongoing monitoring and maintenance once moisture is controlled or managed.
- Be aware of significant landscape and archeological resources in areas to be excavated.

Finally, mitigating the effects of catastrophic moisture, such as floods, requires a different approach and will not be addressed fully in this Brief.

Fig. 1. Moisture problems, if not properly corrected, will increase damage to historic buildings. This waterproof coating trapped moisture from the leaking roof, causing portions of the masonry parapet to fail. Photo: NPS Files.

Figure 1. Maintenance involves selecting the proper treatment and protecting adjacent surfaces. Using painter's tape to mask around a brass doorknocker protects the painted door surface from damage when polishing with chemical compounds. On the other hand, hardware with a patinated finish was not intended to be polished and should simply be cleaned with a damp cloth.

Cautions During Maintenance Work

All maintenance work requires attention to safety of the workers and protection of the historic structure. Examples include the following:

- Care should be taken when working with historic materials containing lead-based paint. For example, damp methods may be used for sanding and removal to minimize air-borne particles. Special protection is required for workers and appropriate safety measures should be followed.
- Materials encountered during maintenance work, such as droppings from pigeons and mice, can cause serious illnesses. Appropriate safety precautions need to be followed. Services of a licensed contractor should be obtained to remove large deposits from attics and crawlspaces.
- Heat removal of paint involves several potential safety concerns. First, heating of lead-containing paint requires special safety precautions for workers. Second, even at low temperature levels, heat removal of paint runs the risk of igniting debris in walls. Heat should be used only with great caution with sufficient coverage by smoke detectors in work areas. Work periods need to be timed to allow monitoring after completion of paint removal each day, since debris will most often smolder for a length of time before breaking out into open flame. The use of torches, open flames, or high heat should be avoided.
- Many chemical products are hazardous and volatile organic compounds (VOC) are banned in many areas. If allowed, appropriate respirators and other safety precautions are essential for use.
- Personal protection is important and may require the use of goggles, gloves, mask, closed-toed shoes, and a hard hat.
- Electrical service should be turned off before inspecting a basement after a flood or heavy rain, where there is high standing water.

pest infestation. Construction assemblies and joints between materials allow for expansion and contraction and the diffusion of moisture vapor, while keeping water from penetrating the building envelope. Older buildings use such features effectively and care must be taken to retain them, avoiding the temptation to reduce air infiltration or otherwise alter them.

Monitoring, inspections, and maintenance should all be undertaken with safety in mind. Besides normal safety procedures, it is important to be cognizant of health issues more commonly encountered with older buildings, such as lead-based paint, asbestos, and bird droppings, and to know when it is necessary to seek professional services (see sidebar).

Original building features and examples of special craftsmanship should be afforded extra care. The patina or aging of historic materials is often part of the charm and character of historic buildings. In such cases, maintenance should avoid attempts to make finishes look new by over-cleaning or cladding existing materials. As with any product that has the potential to harm historic materials, the selection of a cleaning procedure should always involve testing in a discreet location on the building to ensure that it will not abrade, fade, streak, or otherwise damage the substrate (Fig 1).

Maintenance Plan, Schedules and Inspection

Organizing related work into a written set of procedures, or a Maintenance Plan, helps eliminate duplication, makes it easier to coordinate work effort, and creates a system for prioritizing maintenance tasks that takes into account the most vulnerable and character-defining elements.

The first time a property owner or manager establishes a maintenance plan or program, it is advisable to have help from a preservation architect, preservation consultant, and/or experienced contractor. Written procedures should outline step-by-step approaches that are custom- tailored to a building. No matter how small the property, every historic site should have a written guide for maintenance that can be as simple as:

1) Schedules and checklists for inspections;
2) Forms for recording work, blank base plans and elevations to be filled in during inspections and upon completion of work;
3) A set of base-line photographs to be augmented over time;
4) Current lists of contractors for help with complex issues or in case of emergencies;
5) Written procedures for the appropriate care of specific materials, including housekeeping, routine care, and preventive measures;
6) Record-keeping sections for work completed, costs, warranty cards, sample paint colors, and other pertinent material.

This information can be kept in one or more formats, such as a three-ring binder, file folders, or a computer database. It is important to keep the files current with completed work forms to facilitate long-term evaluations and planning for future work (Fig 2).

Proper maintenance depends on an organized plan with work prescribed in manageable components. Regular maintenance needs to be considered a priority both in terms of time allotted for inspections and for allocation of funding.

Maintenance work scheduling is generally based on a variety of factors, including the seriousness of the problem, type of work involved, seasonal appropriateness, product manufacturer's recommendations, and staff availability. There are other variables as well. For example, building materials and finishes on southern and western exposures will often weather faster than those on northern or eastern exposures. Horizontal surfaces facing skyward usually require greater maintenance than vertical ones; in regions with moderate or heavy rainfall, wood and other materials in prolonged shadow are subject to more rapid decay.

Maintenance costs can be controlled, in part, through careful planning, identification of the amount of labor required, and thoughtful scheduling of work. Maintenance schedules should take into account daily and seasonal activities of the property in order to maximize the uninterrupted time necessary to complete the work. Institutions generally need to budget annually between 2 and 4 percent of the replacement value of the building to underwrite the expense of full building maintenance.[2] Use of trained volunteers to undertake maintenance can help reduce costs.

Exterior inspections usually proceed from the roof down to the foundation, working on one elevation at

Cyclic Building Inspection Checklist: Horse Stable — **Inspection date: 04/24/05**

Building Feature	*Material(s)*	*Condition Description*	*Maintenance Action Required*	*Work Done*
ROOF:				
Covering	Clay tile	Two slipped tiles	Reattach tiles	5/4/05
	Painted metal standing seam	Slight corrosion; blistering paint on metal roof section	Sand and repaint area that is peeling	6/8/05
Flashing	Painted metal	Flashing in good condition	N/A	N/A
Gutters/ Downspouts	6" half round galvanized metal	Gutter sagging; downspouts OK	Realign gutter and put on new hanger strap	5/4/05
			Flush out downspouts	5/5/05
Chimneys	No masonry chimney	N/A	N/A	N/A
Attachments/ Penetrations	Metal vent stack and weathervane	Vent stack hood has some peeling paint; vane OK	Sand and repaint vent stack	6/8/05

Figure 2. All personnel associated with a historic structure need to become acquainted with how existing building features should appear and during their daily or weekly routines look for changes that may occur. This will help augment the regular maintenance inspection that will occur at specified intervals based on seasonal changes, use, and other factors. A segment of an inspection form showing the roof elements of a horse stable is shown. The inspection report should be kept along with the maintenance plan and other material in notebook, file or electronic form.

a time, moving around the building in a consistent direction. On the interior, the attic, inside surfaces of exterior walls, and crawlspaces or basements should be examined for signs of potential or existing problems with the building envelope.

The following chart lists suggested inspection frequencies for major features associated with the building's exterior, based on a temperate four-season climate and moderate levels of annual rainfall. For areas of different climate conditions and rainfall, such as in the more arid southwest, the nature of building decay and frequency of inspections will vary. For buildings with certain inherent conditions, heavy use patterns, or locations with more extreme weather conditions, the frequency of inspections should be altered accordingly.

Note: All building features should be inspected after any significant weather event such as a severe rainstorm or unusually high winds.

INSPECTION FREQUENCY CHART

Feature	Minimum Inspection Frequency	Season
Roof	Annually	Spring or fall; every 5 years by roofer
Chimneys	Annually	Fall, prior to heating season; every 5 years by mason
Roof Drainage	6 months; more frequently as needed	Before and after wet season, during heavy rain
Exterior Walls and Porches	Annually	Spring, prior to summer/fall painting season
Windows	Annually	Spring, prior to summer/fall painting season
Foundation and Grade	Annually	Spring or during wet season
Building Perimeter	Annually	Winter, after leaves have dropped off trees
Entryways	Annually; heavily used entries may merit greater frequency	Spring, prior to summer/fall painting season
Doors	6 months; heavily used entry doors may merit greater frequency	Spring and fall; prior to heating/ cooling seasons
Attic	4 months, or after a major storm	Before, during and after wet season
Basement/ Crawlspace	4 months, or after a major storm	Before, during and after rain season

Survey observations can be recorded on a standardized report form and photographs taken as a visual record. All deficient conditions should be recorded and placed on a written schedule to be corrected or monitored.

BUILDING COMPONENTS

For purposes of this discussion, the principal exterior surface areas have been divided into five components and are presented in order from the roof down to grade. While guidance for inspection and maintenance is provided for each component, this information is very general in nature and is not indeed to be comprehensive in scope. Examples have been selected to address some typical maintenance needs and to help the reader avoid common mistakes.

Roofs/chimneys

The roof is designed to keep water out of a building. Thus one of the principal maintenance objectives is to ensure water flows off the roof and into functional gutters and downspouts directly to grade and away from the building—and to prevent water from penetrating the attic, exterior walls, and basement of a building. (Note: Some buildings were designed without gutters and thus assessments must be made as to whether rain water is being properly addressed at the foundation and perimeter grade.) Keeping gutters and downspouts cleared of debris is usually high on the list of regular maintenance activities (Fig 3). Flashing around chimneys, parapets, dormers, and other appendages to the roof also merit regular inspection and appropriate maintenance when needed. The material covering the roof—wood shingles, slate, tile, asphalt, sheet metal, rolled roofing—requires maintenance both to ensure a watertight seal and to lengthen its service life; the type and frequency of maintenance varies with the roofing material. Older chimneys and parapets also require inspection and maintenance. With the exception of cleaning and minor repairs to gutters and downspouts, most roof maintenance work will necessitate use of an outside contractor.

Inspection:

The functioning of gutters and downspouts can be safely observed from the ground during rainy weather and when winter ice has collected. Binoculars are a useful tool in helping to identify potential roofing problems from the same safe vantage point. Careful observation from grade helps to identify maintenance needs between close-up inspections by an experienced roofer. Observation from the building interior is also important to identify possible leak locations. When access can be safely gained to the roof, it is important to wear shoes with slip-resistant soles and to use safety ropes.

Figure 3. Keeping gutters clean of debris can be one of the most important cyclical maintenance activities. On this small one-story addition, a garden hose is being used to flush out the trough to ensure that the gutter and downspouts are unobstructed. Gutters on most small and medium size buildings can be reached with an extension ladder and a garden hose. Photo: Bryan Blundell.

Depending on the nature of the roof, some common conditions of concern to look for are:

- sagging gutters and split downspouts;
- debris accumulating in gutters and valleys;
- overhanging branches rubbing against the roof or gutters
- plant shoots growing out of chimneys;
- slipped, missing, cracked, bucking, delaminating, peeling, or broken roof coverings;
- deteriorated flashing and failing connections at any intersection of roof areas or of roof and adjacent wall;
- bubbled surfaces and moisture ponding on flat or low sloped roofs;
- evidence of water leaks in the attic;
- misaligned or damaged elements, such as decorative cresting, lightning rods, or antennas; and
- cracked masonry or dislodged chimney caps.

Maintenance:

- Remove leaves and other debris from gutters and downspouts. Utilize a ladder with a brace device, if necessary, to keep the ladder from crushing the gutter. Use a garden hose to flush out troughs and downspouts. Patch or repair holes in gutters using products such as fiberglass tape and epoxy adhesive in metal gutters. Avoid asphalt compounds since acidic material can cause further deterioration of metal gutters.
- Correct misaligned gutters and adjust, if necessary, so that water flows to drains and does not pond. If gutter edges sag, consider inserting wooden wedges between the fascia board and the back of the gutter to add support. Seal leaking seams or pinholes in gutters and elbows.
- Broom sweep branch or leaf debris away from shingles, valleys, and crickets, particularly around chimneys and dormers.
- Where mechanical equipment is mounted on flat or low-sloped roofs, ensure that access for maintenance can be provided without damaging the roof. Clean out trapped leaves and debris from around equipment base and consider adding a protective walkway for access.
- Remove biological growth where it is causing erosion or exfoliation of roofing. Use low-pressure garden hose water and a natural or nylon scrubbing brush to remove such growth, scraping with a plastic putty knife or similar wood or plastic tool as needed on heavier buildup. Most growth is acidic and while there are products designed to kill spores, such as diluted chlorine bleach, they should be avoided. Even fairly weak formulas can still cause unexpected color changes, efflorescence, or over-splash damage to plantings or surfaces below the roof. Where appropriate, trim adjacent tree branches to increase sunlight on the roof since sunlight will deter further biological growth.
- Re-secure loose flashing at the dormers, chimneys or parapets. Clean out old mortar, lead, lead wool, or fastening material and make sure that flashing is properly inserted into reglet (slot) joints, taking care not to damage the substrate. Avoid installing new step flashing as a single metal component where multiple pieces are required to provide proper waterproofing. Also avoid attaching step flashing with mastic or sealant. Properly re-bed all step flashing. Use appropriate non-ferrous flashing metal or painted metal if needed. Since cap, step, valley, cricket, and apron flashings each have specific overlap and extension requirements, replacement flashing should match the existing material unless there has been a proven deficiency.

Figure 4. Damage to roofs often requires immediate attention. As a temporary measure, this damaged roof tile could be replaced with a brown aluminum sheet wedged between the existing tiles. Photo: Chad Randl.

Figure 5. The use of a sealant to close an exposed joint is not always an effective long-term solution. Where this decorative wood element connects to the slate roof, the sealant has failed within a short time and a proper metal flashing collar is being fitted instead. Photo: Bryan Blundell.

- Repoint joints in chimneys, parapet, or balustrade capping stones using a hydraulic lime mortar or other suitable mortar where the existing mortar has eroded or cracked, allowing moisture penetration. In general, a mortar that is slightly weaker than the adjacent masonry should be used. This allows trapped moisture in the masonry to migrate out through the mortar and not the masonry. Spalled masonry is often evidence of the previous use of a mortar mix that was too hard.
- Use professional services to repair chimneys and caps. Avoid the use of mortar washes on masonry since they tend to crack, allowing moisture to penetrate and promoting masonry spalling. Repoint masonry with a durable mortar that is slightly weaker than the adjacent masonry. Slope the masonry mortar cap to insure drainage away from the flue. If a chimney rain cap is installed, ensure adequate venting and exhaust.
- As a temporary measure, slip pieces of non-corrosive metal flashing under or between damaged and missing roofing units until new slate, shingles, or tile can be attached. Repair broken, missing or damaged roofing units with ones that match. Follow roofing supplier and industry guidance on inserting and attaching replacement units (Fig 4). Avoid using temporary asphalt patches as it makes a proper repair difficult later on.
- For long-term preservation of wooden shingle roofs coated with a preservative, recoat every few years following the manufacturer's recommendations. Be aware of environmental considerations.
- Scrape and repaint selected areas of coated ferrous metal roofing as needed; repaint on a regularly scheduled basis. Ferrous metal roofs can last a long time if painted regularly. Alkyd coatings are generally used on metal roofs; be sure to wash and properly prepare the area beforehand. Environmental regulations may restrict the use of certain types of paints. Apply the coating system in accordance with manufacturer's recommendations. Prepare the surface prior to application to obtain good adhesion with the prime coat. Apply both a prime coat and a topcoat for good bonding and coverage; select primer and topcoat products from the same manufacturer.
- Re-secure loose decorative elements, such as finials and weathervanes. Seek professional advice if decorative elements exhibit considerable corrosion, wood rot, or structural instability. Small surface cracks may benefit from a flexible sealant to keep moisture out; sealants have a limited life and require careful inspection and periodic replacement (Fig 5).

Exterior Walls

Exterior walls are designed to help prevent water infiltration, control air infiltration, and serve as a barrier for unwanted animals, birds and insects. The primary maintenance objective is to keep walls in sound condition and to prevent water penetration, insect infestation, and needless decay (Fig 6). Depending on the materials and construction methods, walls should have an even appearance, free from unwanted cracks, and should be able to shed excess moisture. Where surfaces are significantly misaligned or where there are bulging wall sections

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or cracks indicative of potential structural problems, seek professional guidance as to the cause of distress and appropriate corrective measures. Wood-frame construction generally will require more frequent maintenance than buildings constructed of brick, stone, or terra cotta (Fig 7).

Inspections:

It is best to inspect walls during dry as well as wet weather. Look for moisture patterns that may appear on the walls after a heavy or sustained rainfall or snow, recording any patterns on elevation drawings or standard recording forms. Monitoring the interior wall for moisture or other potential problems is important as well. Look for movement in cracks, joints, and around windows and doors and try to establish whether movement is seasonal in nature (such as related to shrinkage of wood during dry weather) or signs of an ongoing problem. For moderate size buildings, a ladder or mechanical lift may be necessary, though in some cases the use of binoculars and observations made from windows and other openings will be sufficient. When examining the walls, some common conditions of concern to look for are:

- Misaligned surfaces, bulging wall sections, cracks in masonry units, diagonal cracks in masonry joints, spalling masonry, open joints, and nail popping;
- Evidence of wood rot, insect infestation, and potentially damaging vegetative growth;
- Deficiencies in the attachment of wall mounted lamps, flag pole brackets, signs, and similar items;
- Potential problems with penetrating features such as water spigots, electrical outlets, and vents;
- Excessive damp spots, often accompanied by staining, peeling paint, moss, or mold; and
- General paint problems (Fig 8).

Maintenance:

• Trim tree branches away from walls. Remove ivy and tendrils of climbing plants by first cutting at the base of the vine to allow tendrils to die back, and later using a plastic scraper to dislodge debris and an appropriate digging tool to dislodge and remove root systems. Be cautious if using a commercial chemical to accelerate root decay; follow safety directions and avoid contact of chemicals with workers and wall materials.

• Wash exterior wall surfaces if dirt or other deposits are causing damage or hiding deterioration; extend

Figure 6. Stucco applied to an exterior wall or foundation was intended to function as a watertight surface. Unless maintained, rainwater will penetrate open joints and cracks that may occur over time. A spalled section of stucco indicates some damage has occurred and a wooden mallet is being used to tap the surface to determine whether the immediate stucco has lost adhesion. Photo: Bryan Blundell.

Figure 7. One of the advantages of wood shingles as a wall covering is that individual shingles that are damaged can easily be replaced. On this highly exposed corner, worn shingles have been selectively replaced to help safeguard against water damage. The new shingles will be stained to match the existing shingles.

Figure 8. The paint on the siding of this south-facing wall needs to be scraped, sanded, primed and repainted. Postponing such work will lead to further paint failure, require greater preparatory costs, and could even result in the need to replace some siding. Photo: Charles Fisher.

Figure 9. To help extend a repainting cycle, dirt and spider webs should be removed before permanent staining occurs. In this case, a natural bristle brush and a soft damp cloth are being used to remove insect debris and refresh the surface appearance.

scheduled times for cleaning for cosmetic purposes to reduce frequency (Fig 9). When cleaning, use the gentlest means possible; start with natural bristle brushes and water and only add a mild phosphate-free detergent if necessary. Use non-abrasive cleaning methods and low-pressure water from a garden hose. For most building materials, such as wood and brick, avoid abrasive methods such as mechanical scrapers and high-pressure water or air and such additives as sand, natural soda, ice crystals, or rubber products. All abrasives remove some portion of the surface and power-washing drives excessive moisture into wall materials and even into wall cavities and interior walls. If using a mild detergent, two people are recommended, one to brush and one to prewet and rinse. When graffiti or stains are present, consult a preservation specialist who may use poultices or mild chemicals to remove the stain. If the entire building needs cleaning other than described above, consult a specialist.

• Repoint masonry in areas where mortar is loose or where masonry units have settled. Resolve cause of cracks or failure before resetting units and repointing. Rake out joints by hand, generally avoiding rotary saws or drills, to a depth of 2 ½ times the width of the joint (or until sound mortar is encountered), to make sure that fresh mortar will not pop out. Repointing mortar should be lime-rich and formulated to be slightly weaker than the masonry units and to match the historic mortar in color, width, appearance, and tooling. Off-the-shelf pre-mixed cement mortars are not appropriate for most historic buildings. Avoid use of joint sealants in place of mortar on vertical masonry wall surfaces, as they are not breathable and can lead to moisture-related damage of the adjacent masonry (Fig 10).

• Correct areas that trap unwanted moisture. Damaged bricks or stone units can sometimes be removed, turned around, and reset, or replaced with salvaged units. When using traditional or contemporary materials for patching wood, masonry, metal, or other materials, ensure that the materials are compatible with the substrate; evaluate strength, vapor permeability, and thermal expansion, as well as appearance.

• When patching is required, select a compatible patch material. Prepare substrate and install patch material according to manufacturer's recommendations; respect existing joints. Small or shallow surface defects may not require patching; large or deep surface defects may be better addressed by installation of a dutchman unit than by patching.

• Where a damaged area is too large to patch, consider replacing the section with in-kind material. For stucco and adobe materials, traditional patching formulas are recommended.

• When temporarily removing wood siding to repair framing or to tighten corner boards and loose trim, reuse the existing siding where possible. Consider using stainless steel or high strength aluminum nails as appropriate. Putty or fill nail holes flush with siding prior to repainting. Back-prime any installed wood with

Figure 10. Repointing of masonry should usually be approached as repair rather than maintenance work in part because of the need for a skilled mason familiar with historic mortar. In this case, a moisture condition was not corrected and the use of a waterproof coating and off-the-shelf Portland cement mortar trapped water and resulted in further damage to these 19th century bricks. Photo: NPS files.

one coat of primer and coat end grain that might be exposed with two coats of primer.

• Prepare, prime, and spot paint areas needing repainting. Remember that preparation is the key to a successful long lasting paint job. Ensure beforehand the compatibility of new and existing paints to avoid premature paint failure. Remove loose paint to a sound substrate; sand or gently rough surface if needed for a good paint bond; wipe clean; and repaint with appropriate primer and topcoats. Follow manufacturer's recommendations for application of coatings, including temperature parameters for paint application. Use top quality coating materials. Generally paint when sun is not shining directly onto surfaces to be painted.

• Remove deteriorated caulks and sealants, clean, and reapply appropriate caulks and sealants using backer rods as necessary. Follow manufacturer's instructions regarding preparation and installation.

• Correct deficiencies in any wall attachments such as awning and flag pole anchors, improperly installed electrical outlets, or loose water spigots.

Openings

Exterior wall openings primarily consist of doors, windows, storefronts, and passageways. The major maintenance objectives are to retain the functioning nature of the opening and to keep in sound condition the connection between the opening and the wall in order to reduce air and water infiltration.

Inspection:

Wall openings are typically inspected from inside as well as out. Examinations should include the overall material condition; a check for unwanted water penetration, insect infiltration, or animal entry; and identification of where openings may not be properly functioning. Frames should be checked to make sure they are not loose and to ascertain whether the intersection between the wall and the frame is properly sealed. Secure connections of glazing to sash and between sash and frames are also important. Particular attention should be placed on exposed horizontal surfaces of storefronts and window frames as they tend to deteriorate much faster than vertical surfaces. Inspections should identify:

- loose frames, doors, sash, shutters, screens, storefront components, and signs that present safety hazards;
- slipped sills and tipped or cupped thresholds;
- poorly fitting units and storm assemblies, misaligned frames, drag marks on thresholds from sagging doors and storm doors;
- loose, open, or decayed joints in door and window frames, doors and sash, shutters, and storefronts;
- loose hardware, broken sash cords/chains, worn sash pulleys, cracked awning, shutter and window hardware, locking difficulties, and deteriorated weatherstripping and flashing;
- broken/cracked glass, loose or missing glazing and putty;
- peeling paint, corrosion or rust stains; and
- window well debris accumulation, heavy bird droppings, and termite and carpenter ant damage.

Maintenance:

• Replace broken or missing glass as soon as possible; in some cases cracked glass may be repaired using specialty glues. For historic crown glass and early cylinder glass, a conservation approach should be considered to repair limited cracks. Where panes with a distinct appearance are missing, specialty glass should be obtained to match, with sufficient inventory kept for future needs. Avoid using mechanical devices to remove old putty and match historic putty bevels or details when undertaking work.

• Reputty window glazing where putty is deteriorated or missing. Take care in removing putty so as not to crack or break old glass or damage muntins and sash frames. Re-glaze with either traditionally formulated

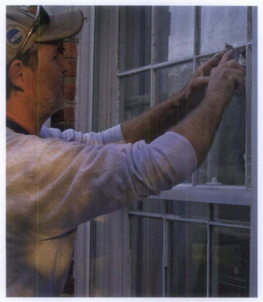

Figure 11. Glazing putty should be maintained in sound condition to prevent unwanted air infiltration and water damage. New glazing putty should be pulled tight to the glass and edge of the wood, creating a clean bevel that matches the historic glazing.

oil putties or modern synthetic ones, making sure to properly bed the glass and secure with glazing points (Fig 11).

• Clean window glass, door glazing, storefronts, transom prism lights, garage doors, and storm panels using a mild vinegar and water mixture or a non-alkaline commercial window cleaner. Be cautious with compounds that contain ammonia as they may stain brass or bronze hardware elements if not totally removed. When using a squeegee blade or sponge, wipe wet corners with a soft dry cloth. Avoid high-pressure washes.

• Clean handles, locks and similar hardware with a soft, damp cloth. Use mineral spirits or commercial cleaners very sparingly, as repeated use may remove original finishes. Most metal cleaners include ammonia that can streak and stain metal, so it is important to remove all cleaning residue. Polished hardware subject to tarnishing or oxidation, particularly doorknobs, often benefits from a thin coat of paste wax (carnauba), hand buffed to remove extra residue. Avoid lacquer finishes for high use areas, as they require more extensive maintenance. Patinated finishes should not be cleaned with any chemicals, since the subtle aged appearance contributes to the building's character.

• Remove and clean hardware before painting doors and windows; reinstall after the paint has dried.

• Tighten screws in doorframes and lubricate door hinges, awning hardware, garage door mechanisms, window sash chains, and pulleys using a graphite or silicone type lubricant.

Contracting Maintenance and Repair Work

Many contractors are very proficient in using modern construction methods and materials; however, they may not have the experience or skill required to carry out maintenance on historic buildings. The following are tips to use when selecting a contractor to work on your historic building:

1. Become familiar with work done on similar historic properties in your area so that you can obtain names of possible preservation contractors.
2. Be as specific as possible in defining the scope of work you expect to undertake.
3. Ask potential contractors for multiple references (three to five) and visit previous work sites. Contact the building owner or manager and ask how the job proceeded; if the same work crew was retained from start to finish; if the workers were of a consistent skill level; whether the project was completed in a reasonable time; and whether the person would use the contractor again.
4. Be familiar with the preservation context of the work to be undertaken. Use the written procedures in your maintenance plan to help define the scope of work in accordance with preservation standards and guidelines. Always request that the gentlest method possible be used. Use a preservation consultant if necessary to ensure that the work is performed in an appropriate manner.
5. Request in the contract proposal a detailed cost estimate that clearly defines the work to be executed, establishes the precautions that will be used to protect adjoining materials, and lists specific qualified subcontractors, if any, to be used.
6. Insure that the contractor has all necessary business licenses and carries worker compensation.

• Check weather stripping on doors and windows and adjust or replace as necessary. Use a durable type of weather stripping, such as spring metal or high quality synthetic material, avoiding common brush and bulb or pile weather stripping that require more frequent replacement.

• Adjust steel casement windows as needed for proper alignment and tight fit. Avoid additional weather stripping as this may lead to further misalignment, creating pathways for air and water infiltration.

• Check window sills for proper drainage. Fill cracks in wood sills with a wood filler or epoxy. Follow manufacturer's instructions for preparation and installation. Do not cover over a wood sill with metal panning, as it may trap moisture and promote decay.

• Repair, prime, and repaint windows, doors, frames, and sills when needed. Clean out putty debris and paint chips from windows using a wet paper towel and dispose of debris prior to repair or repainting. Take appropriate additional precautions when removing lead-based paint. Sand and prepare surfaces and use material-specific patching compounds to fill any holes or areas collecting moisture (Fig 12). Avoid leaving exposed wood unpainted for any length of time, as light will degrade the wood surface and lead to premature failure of subsequent paint applications. Immediately prime steel sash after paint is removed and the substrate prepared for repainting.

Figure 12. Good surface preparation is essential for long lasting paint. Scraping loose paint, filling nail holes and cracks, sanding, and wiping with a damp cloth prior to repainting are all important steps whether touching up small areas or repainting an entire feature. Always use a manufacturer's best quality paint. Windows and shutters may need repainting every five to seven years, depending on exposure and climate.

• Adjust wood sash that bind when operated. Apply beeswax, paraffin, or similar material to tracks or sash runs for ease of movement. If sash are loose, replace worn parting beads. Sash runs traditionally were unpainted between the stop and parting bead; removing subsequent paint applications will often help improve sash operation.

• Correct perimeter cracks around windows and doors to prevent water and air infiltration. Use traditional material or modern sealants as appropriate. If fillers such as lead wool have been used, new wool can be inserted with a thin blade tool, taking care to avoid damage to adjacent trim. Reduce excess air infiltration around windows by repairing and lubricating sash locks so that windows close tightly.

Figure 13. Window air conditioning units can cause damage to surfaces below when condensation drips in an uncontrolled manner. Drip extension tubes can sometimes be added to direct the discharge.

• Remove debris beneath window air conditioning units and ensure that water from units does not drain onto sills or wall surfaces below (Fig 13). Removal of air conditioning units when not in season is recommended.

• Adjust storm panels and clean weep holes; check that weep holes at the bottom of the panels are open so water will not be trapped on the sill. Exterior applied storm windows are best attached using screws and not tightly adhered with sealant. Use of sealant makes storm units difficult to remove for maintenance and can contribute to moisture entrapment if weep holes become clogged.

• Remove weakened or loose shutters and store for later repair. Consider adding a zinc or painted metal top to shutters as a protective cap to cover the wood's exposed end grain. This will extend the life of the shutters.

Projections

Numerous projections may exist on a historic building, such as porches, dormers, skylights, balconies, fire escapes, and breezeways. They are often composed of several different materials and may include an independent roof. Principal maintenance objectives include directing moisture off these features and keeping weathered surfaces in good condition. Secondary projections may include brackets, lamps, hanging signs, and similar items that tend to be exposed to the elements.

Inspection:

In some cases, projections are essentially independent units of a building and so must be evaluated carefully for possible settlement, separation from the main body of the building, and materials deterioration. Some electrical features may require inspection by a electrician or service technician. Common conditions of concern to look for are:

- damaged flashing or tie-in connections of projecting elements;
- misaligned posts and railings;
- deteriorated finishes and materials, including peeling paint, cupped and warped decking, wood deterioration, and hazardous steps;
- evidence of termites, carpenter ants, bees, or animal pests (Fig 14);
- damaged lamps, unsafe electrical outlets or deteriorated seals around connections;
- loose marker plaques, sign, or mail boxes; and
- rust and excessive wear of structural, anchorage, and safety features of balconies and fire escapes.

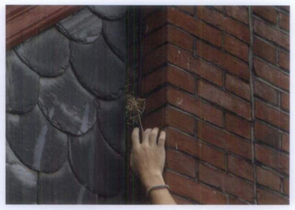

Figure 14. When inspecting connections between projections and the main building, look for areas where birds, bees and pests may enter or nest. Birds have been nesting in this porch roof and the area is being cleaned of their debris. Where an opening exists, it may be necessary to cover it with a trim piece, screening, or sealant. Photo: Bryan Blundell.

Maintenance:

• Selectively repair or replace damaged roofing units on porches and other projections. Ensure adequate drainage away from the building. Repair flashing connections as needed; clean and seal open joints as appropriate.

• Secure any loose connections, such as on porch rails or fire escapes.

• Maintain ferrous metal components by following manufacturer's recommendation for cleaning and repainting. Remove rust and corrosion from porch handrails, balconies, fire escapes, and other metal features; prepare, prime, and repaint using a corrosion-inhibitive coating system. Apply new primer before new corrosion sets in, followed by new topcoat. Take appropriate safety measures when dealing with existing lead-based paint and in using corrosion-removal products (Fig 15).

• Reattach loose brackets, lamps, or signs. With electrical boxes for outlets or lighting devices, ensure that cover plates are properly sealed. Prime and paint metal elements as needed.

• Keep porch decks and steps free from dust, dirt, leaf debris, and snow as soon at it accumulates using a broom or plastic blade shovel.

• Repair areas of wood decay or other damage to railings, posts, and decorative elements. Repair with wood dutchman, wood putty, or epoxy filler, as appropriate; replace individual elements as needed.

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Historical Resources

Town Hall Structural Roof Replacement & Exterior Restoration

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Figure 15. Metal projecting elements on a building, such as sign armatures and railings, are easily subject to rust and decay. Proper surface preparation to remove rust is essential. Special metal primers and topcoats should be used.

Prime and repaint features when necessary and repaint horizontal surfaces on a more frequent basis.

• Sand and repaint porch floorboards to keep weather surfaces protected. The exposed ends of porch floorboards are especially susceptible to decay and may need to be treated every year or two.

• Carefully cut out damaged or buckled porch flooring and replace with wood to match. Back-prime new wood that is being installed; treat end grain with wood preservative and paint primer. Ensure that new wood is adequately kiln or air-dried to avoid shrinkage and problems with paint adherence.

• Repair rotted stair stringers; adjust grade or add stone pavers at stair base to keep wooden elements from coming into direct contact with soil.

• Consider durable hardwoods for replacement material where beading, chamfering, or other decorative work is required in order to match existing features being replaced. Although appropriate for certain applications, pressure treated lumber is hard to tool and may inhibit paint adherence if not allowed to weather prior to coating application.

• Clean out any debris from carpenter bees, ants, termites, and rodents, particularly from under porches. Replace damaged wood and add screening or lattice to discourage rodents. Consider treating above ground features with a borate solution to deter termites and wood rot and repaint exposed surfaces.

Foundations and Perimeter Grades

The foundation walls that penetrate into the ground, the piers that support raised structures, and the ground immediately around a foundation (known as grade) serve important structural functions. To help sustain these functions, it is important that there is good drainage around and away from the building. The maintenance goal is to prevent moisture from entering foundations and crawl spaces and damaging materials close to the grade, and to provide ventilation in damp areas.

Inspection:

Inspections at the foundation should be done in conjunction with the inspection of the downspouts to ensure that water is being discharged a sufficient distance from the building perimeter to avoid excessive dampness in basements or crawl spaces. In addition, crawl spaces should be adequately vented to deter mold and decay and should be screened or otherwise secured against animals. Look for:

- depressions or grade sloping toward the foundation; standing water after a storm;

Figure 16. This chronically wet area has a mildew bloom brought on by heat generated from the air-conditioning condenser unit. The dampness could be caused be a clogged roof gutter, improper grading, or a leaking hose bibb.

Sealants and Caulks

Using sealants and caulks has become a familiar part of exterior maintenance today. As the use of precision joinery and certain traditional materials to render joints more weathertight has waned in recent years, caulks and more often elastomeric sealants are used to seal cracks and joints to keep out moisture and reduce air infiltration. Where cracks and failing joints are indicators of a serious problem, sealants and caulks may be used as a temporary measure. In some cases they may actually exacerbate the existing problem, such as by trapping moisture in adjacent masonry, and lead to more costly repairs.

Manufacturer's recommendations provide instructions on the proper application of caulks and sealants. Special attention should be placed on ensuring that the subsurface or joint is properly prepared and cleaned. Backer rods may be necessary for joints or cracks. Tooling of the caulk or sealant is usually necessary to ensure contact with all edge surfaces and for a clean and consistent appearance.

Caulks generally refer to older oil resin-based products, which have relatively limited life span and limited flexibility. Contemporary elastomeric sealants are composed of polymer synthetics. Elastomeric sealants are more durable than caulks and have greater flexibility and wider application. Caulks and sealants can become maintenance problems, as they tend to deteriorate faster than their substrates and must be replaced periodically as a part of cyclical maintenance of the structure.

The selection criteria for caulks and sealants include type of substrate, adhesion properties, size and configuration of joint, intended appearance/color and paintability, movement characteristics, and service life. Both one-part and two-part sealants are available; the latter require mixing as part of the application process. Sealants are commonly used for a variety of places on the exterior of a building such as around windows and doors, at interfaces between masonry and wood, between various wood features or elements, and at attachments to or through walls or roofs, such as with lamps, signs, or exterior plumbing fixtures. Their effectiveness depends on numerous factors including proper surface preparation and application. Applications of sealants and caulks should be examined as part of routine maintenance inspection, irrespective of their projected life expectancy.

Installation of caulks and sealants often can be undertaken by site personnel. For large and more complex projects, a contactor experienced in sealant installation may be needed. In either case, the sealant manufacturer should be consulted on proper sealant selection, preparation, and installation procedures.

- material deterioration at or near the foundation, including loss of mortar in masonry, rotting wood clapboards, or settlement cracks in the lower sections of wall;
- evidence of animal or pest infestation;
- vegetation growing close to the foundation, including trees, shrubs and planting beds;
- evidence of moisture damage from lawn and garden in-ground sprinkler systems;
- evidence of moss or mold from damp conditions or poorly situated downspout splash blocks (Fig 16); and
- blocked downspout drainage boots or clogged areaway grates.

Maintenance:

• Remove leaves and other debris from drains to prevent accumulation. Detach drain grates from paved areas and extract clogged debris. Flush with a hose to ensure that there is no blockage. Use a professional drain service to clear obstructions if necessary.

• Conduct annual termite inspections. Promptly address termite and other insect infestations. Use only licensed company for treatment where needed.

• Keep the grade around the foundation sloping away from the building. Add soil to fill depressions particularly around downspouts and splash blocks. Make sure that soil does not come too close to wooden or metal elements. A 6" separation between wooden siding and the grade is usually recommended.

• Avoid use of mulching material immediately around foundations as such material may promote termite infestation, retain moisture or change existing grade slope.

• Reset splash blocks at the end of downspouts or add extender tubes to the end of downspouts as necessary (Fig 17).

• Lubricate operable foundation vent grilles to facilitate seasonal use; paint as needed.

• Manage vegetation around foundations to allow sufficient air movement for wall surfaces to dry out during damp periods. Trim plantings and remove weeds and climbing vine roots. Be careful not to scar foundations or porch piers with grass or weed cutting equipment. If tree roots appear to be damaging a foundation wall, consult an engineer as well as a tree company.

• Wash off discoloration on foundations caused by splash-back, algae, or mildew. Use plain water and a soft natural or nylon bristle brush. Unless thoroughly researched and tested beforehand on a discreet area of the wall, avoid chemical products that may discolor certain types of stone. If cleaning products are used, test beforehand in a discreet area; and avoid over splash to plantings and adjacent building materials.

• Selectively repoint unit masonry as needed. Follow guidance under the wall section in regard to compatible mix, appearance, and texture for pointing mortar.

• Avoid using salts for de-icing and fertilizers with a high acid or petro-chemical content around foundations, as these materials can cause salt contamination of masonry. Use sand or organic materials without chloride additives that can damage masonry. Where salt is used on icy walks, distribute it sparingly and sweep up residual salt after walks have dried.

• Use snow shovels and brooms to clean snow from historic paths and walkways. Avoid blade-type snow removers as they may chip or abrade cobblestones, brick, or stone paving. Note that use of steel snow removal tools in areas where salt-containing snow melters are used may result in rust staining from steel fragments left on the paving.

Figure 17. Extending downspouts at their base is one of the basic steps to reduce dampness in basements, crawl spaces and around foundations. Extensions should be buried, if possible, for aesthetics, ease of lawn care, and to avoid creating a tripping hazard. Photo: NPS files.

Conclusion

Maintenance is the most important preservation treatment for extending the life of a historic property. It is also the most cost effective. Understanding the construction techniques of the original builders and the performance qualities of older building materials, using traditional maintenance and repair methods, and selecting in-kind materials where replacements are needed will help preserve the building and its historic character.

Maintenance can be managed in small distinct components, coordinated with other work, and scheduled over many years to ensure that materials are properly cared for and their life span maximized. A written maintenance plan is the most effective way to organize, schedule, and guide the work necessary to properly care for a historic building. The maintenance plan should include a description of the materials and methods required for each task, as well as a schedule for work required for maintenance of different building materials and components.

Historic house journals, maintenance guides for older buildings, preservation consultants, and preservation maintenance firms can assist with writing appropriate procedures for specific properties. Priorities should be established for intervening when unexpected damage occurs such as from broken water pipes or high winds.

Worker safety should always be paramount. When work is beyond the capabilities of in-house personnel and must be contracted, special efforts should be made to ensure that a contractor is both experienced in working with historic buildings and utilizes appropriate preservation treatments.

A well-maintained property is a more valuable property and one that will survive as a legacy for generations to come.

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Acknowledgements

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47 PRESERVATION BRIEFS

Maintaining the Exteriors of Small and Medium Size Historic Buildings

Sharon C. Park, FAIA

National Park Service
U.S. Department of the Interior
Heritage Preservation Services

Preservation is defined as "the act or process of applying measures necessary to sustain the existing form, integrity, and materials of an historic property. Work, including preliminary measures to protect and stabilize the property, generally focuses upon the *ongoing maintenance and repair* of historic materials and features rather than extensive replacement and new construction."[1]

Maintenance helps preserve the integrity of historic structures. If existing materials are regularly maintained and deterioration is significantly reduced or prevented, the integrity of materials and workmanship of the building is protected. Proper maintenance is the most cost effective method of extending the life of a building. As soon as a building is constructed, restored, or rehabilitated, physical care is needed to slow the natural process of deterioration. An older building has already experienced years of normal weathering and may have suffered from neglect or inappropriate work as well.

Decay is inevitable but deterioration can accelerate when the building envelope is not maintained on a regular basis. Surfaces and parts that were seamlessly joined when the building was constructed may gradually become loose or disconnected; materials that were once sound begin to show signs of weathering. If maintenance is deferred, a typical response is to rush in to fix what has been ignored, creating additional problems. Work done on a crisis level can favor inappropriate treatments that alter or damage historic material.

There are rewards for undertaking certain repetitive tasks consistently according to a set schedule. Routine and preventive care of building materials is the most effective way of slowing the natural process of deterioration. The survival of historic buildings in good condition is primarily due to regular upkeep and the preservation of historic materials.

Well-maintained properties tend to suffer less damage from storms, high winds, and even small earthquakes. Keeping the roof sound, armatures and attachments such as shutters tightened and secured, and having joints and connections functioning well, strengthens the ability of older buildings to withstand natural occurrences.

Over time, the cost of maintenance is substantially less than the replacement of deteriorated historic features and involves considerably less disruption. Stopping decay before it is widespread helps keep the scale and complexity of work manageable for the owner.

This *Preservation Brief* is designed for those responsible for the care of small and medium size historic buildings, including owners, property administrators, in-house maintenance staff, volunteers, architects, and maintenance contractors. The Brief discusses the benefits of regular inspections, monitoring, and seasonal maintenance work; provides general guidance on maintenance treatments for historic building exteriors; and emphasizes the importance of keeping a written record of completed work.

Getting Started

Understanding how building materials and construction details function will help avoid treatments that are made in an attempt to simplify maintenance but which may also result in long-term damage. It is enticing to read about "maintenance free" products and systems, particularly waterproof sealers, rubberized paints, and synthetic siding, but there is no such thing as maintenance free when it comes to caring for historic buildings. Some approaches that initially seem to reduce maintenance requirements may over time actually accelerate deterioration.

Exterior building components, such as roofs, walls, openings, projections, and foundations, were often constructed with a variety of functional features, such as overhangs, trim pieces, drip edges, ventilated cavities, and painted surfaces, to protect against water infiltration, ultraviolet deterioration, air infiltration, and

Figure 1. Maintenance involves selecting the proper treatment and protecting adjacent surfaces. Using painter's tape to mask around a brass doorknocker protects the painted door surface from damage when polishing with chemical compounds. On the other hand, hardware with a patinated finish was not intended to be polished and should simply be cleaned with a damp cloth.

Cautions During Maintenance Work

All maintenance work requires attention to safety of the workers and protection of the historic structure. Examples include the following:

- Care should be taken when working with historic materials containing lead-based paint. For example, damp methods may be used for sanding and removal to minimize air-borne particles. Special protection is required for workers and appropriate safety measures should be followed.
- Materials encountered during maintenance work, such as droppings from pigeons and mice, can cause serious illnesses. Appropriate safety precautions need to be followed. Services of a licensed contractor should be obtained to remove large deposits from attics and crawlspaces.
- Heat removal of paint involves several potential safety concerns. First, heating of lead-containing paint requires special safety precautions for workers. Second, even at low temperature levels, heat removal of paint runs the risk of igniting debris in walls. Heat should be used only with great caution with sufficient coverage by smoke detectors in work areas. Work periods need to be timed to allow monitoring after completion of paint removal each day; since debris will most often smolder for a length of time before breaking out into open flame. The use of torches, open flames, or high heat should be avoided.
- Many chemical products are hazardous and volatile organic compounds (VOC) are banned in many areas. If allowed, appropriate respirators and other safety precautions are essential for use.
- Personal protection is important and may require the use of goggles, gloves, mask, closed-toed shoes, and a hard hat.
- Electrical service should be turned off before inspecting a basement after a flood or heavy rain, where there is high standing water.

pest infestation. Construction assemblies and joints between materials allow for expansion and contraction and the diffusion of moisture vapor, while keeping water from penetrating the building envelope. Older buildings use such features effectively and care must be taken to retain them, avoiding the temptation to reduce air infiltration or otherwise alter them.

Monitoring, inspections, and maintenance should all be undertaken with safety in mind. Besides normal safety procedures, it is important to be cognizant of health issues more commonly encountered with older buildings, such as lead-based paint, asbestos, and bird droppings, and to know when it is necessary to seek professional services (see sidebar).

Original building features and examples of special craftsmanship should be afforded extra care. The patina or aging of historic materials is often part of the charm and character of historic buildings. In such cases, maintenance should avoid attempts to make finishes look new by over-cleaning or cladding existing materials. As with any product that has the potential to harm historic materials, the selection of a cleaning procedure should always involve testing in a discreet location on the building to ensure that it will not abrade, fade, streak, or otherwise damage the substrate (Fig 1).

Maintenance Plan, Schedules and Inspection

Organizing related work into a written set of procedures, or a Maintenance Plan, helps eliminate duplication, makes it easier to coordinate work effort, and creates a system for prioritizing maintenance tasks that takes into account the most vulnerable and character-defining elements.

The first time a property owner or manager establishes a maintenance plan or program, it is advisable to have help from a preservation architect, preservation consultant, and/or experienced contractor. Written procedures should outline step-by-step approaches that are custom- tailored to a building. No matter how small the property, every historic site should have a written guide for maintenance that can be as simple as:

1) Schedules and checklists for inspections;
2) Forms for recording work, blank base plans and elevations to be filled in during inspections and upon completion of work;
3) A set of base-line photographs to be augmented over time;
4) Current lists of contractors for help with complex issues or in case of emergencies;
5) Written procedures for the appropriate care of specific materials, including housekeeping, routine care, and preventive measures;
6) Record-keeping sections for work completed, costs, warranty cards, sample paint colors, and other pertinent material.

This information can be kept in one or more formats, such as a three-ring binder, file folders, or a computer database. It is important to keep the files current with completed work forms to facilitate long-term evaluations and planning for future work (Fig 2).

Proper maintenance depends on an organized plan with work prescribed in manageable components. Regular maintenance needs to be considered a priority both in terms of time allotted for inspections and for allocation of funding.

Maintenance work scheduling is generally based on a variety of factors, including the seriousness of the problem, type of work involved, seasonal appropriateness, product manufacturer's recommendations, and staff availability. There are other variables as well. For example, building materials and finishes on southern and western exposures will often weather faster than those on northern or eastern exposures. Horizontal surfaces facing skyward usually require greater maintenance than vertical ones; in regions with moderate or heavy rainfall, wood and other materials in prolonged shadow are subject to more rapid decay.

Maintenance costs can be controlled, in part, through careful planning, identification of the amount of labor required, and thoughtful scheduling of work. Maintenance schedules should take into account daily and seasonal activities of the property in order to maximize the uninterrupted time necessary to complete the work. Institutions generally need to budget annually between 2 and 4 percent of the replacement value of the building to underwrite the expense of full building maintenance.[2] Use of trained volunteers to undertake maintenance can help reduce costs.

Exterior inspections usually proceed from the roof down to the foundation, working on one elevation at

Cyclic Building Inspection Checklist: Horse Stable — Inspection date: 04/24/05

Building Feature	Material(s)	Condition Description	Maintenance Action Required	Work Done
ROOF:				
Covering	Clay tile	Two slipped tiles	Reattach tiles	5/4/05
	Painted metal standing seam	Slight corrosion; blistering paint on metal roof section	Sand and repaint area that is peeling	6/8/05
Flashing	Painted metal	Flashing in good condition	N/A	N/A
Gutters/ Downspouts	6" half round galvanized metal	Gutter sagging; downspouts OK	Realign gutter and put on new hanger strap	5/4/05
			Flush out downspouts	5/5/05
Chimneys	No masonry chimney	N/A	N/A	N/A
Attachments/ Penetrations	Metal vent stack and weathervane	Vent stack hood has some peeling paint; vane OK	Sand and repaint vent stack	6/8/05

Figure 2. All personnel associated with a historic structure need to become acquainted with how existing building features should appear and during their daily or weekly routines look for changes that may occur. This will help augment the regular maintenance inspection that will occur at specified intervals based on seasonal changes, use, and other factors. A segment of an inspection form showing the roof elements of a horse stable is shown. The inspection report should be kept along with the maintenance plan and other material in notebook, file or electronic form.

a time, moving around the building in a consistent direction. On the interior, the attic, inside surfaces of exterior walls, and crawlspaces or basements should be examined for signs of potential or existing problems with the building envelope.

The following chart lists suggested inspection frequencies for major features associated with the building's exterior, based on a temperate four-season climate and moderate levels of annual rainfall. For areas of different climate conditions and rainfall, such as in the more arid southwest, the nature of building decay and frequency of inspections will vary. For buildings with certain inherent conditions, heavy use patterns, or locations with more extreme weather conditions, the frequency of inspections should be altered accordingly.

Note: All building features should be inspected after any significant weather event such as a severe rainstorm or unusually high winds.

INSPECTION FREQUENCY CHART

Feature	Minimum Inspection Frequency	Season
Roof	Annually	Spring or fall; every 5 years by roofer
Chimneys	Annually	Fall, prior to heating season; every 5 years by mason
Roof Drainage	6 months; more frequently as needed	Before and after wet season, during heavy rain
Exterior Walls and Porches	Annually	Spring, prior to summer/fall painting season
Windows	Annually	Spring, prior to summer/fall painting season
Foundation and Grade	Annually	Spring or during wet season
Building Perimeter	Annually	Winter, after leaves have dropped off trees
Entryways	Annually; heavily used entries may merit greater frequency	Spring, prior to summer/fall painting season
Doors	6 months; heavily used entry doors may merit greater frequency	Spring and fall; prior to heating/ cooling seasons
Attic	4 months, or after a major storm	Before, during and after wet season
Basement/ Crawlspace	4 months, or after a major storm	Before, during and after rain season

Survey observations can be recorded on a standardized report form and photographs taken as a visual record. All deficient conditions should be recorded and placed on a written schedule to be corrected or monitored.

BUILDING COMPONENTS

For purposes of this discussion, the principal exterior surface areas have been divided into five components and are presented in order from the roof down to grade. While guidance for inspection and maintenance is provided for each component, this information is very general in nature and is not indeed to be comprehensive in scope. Examples have been selected to address some typical maintenance needs and to help the reader avoid common mistakes.

Roofs/chimneys

The roof is designed to keep water out of a building. Thus one of the principal maintenance objectives is to ensure water flows off the roof and into functional gutters and downspouts directly to grade and away from the building—and to prevent water from penetrating the attic, exterior walls, and basement of a building. (Note: Some buildings were designed without gutters and thus assessments must be made as to whether rain water is being properly addressed at the foundation and perimeter grade.) Keeping gutters and downspouts cleared of debris is usually high on the list of regular maintenance activities (Fig 3). Flashing around chimneys, parapets, dormers, and other appendages to the roof also merit regular inspection and appropriate maintenance when needed. The material covering the roof—wood shingles, slate, tile, asphalt, sheet metal, rolled roofing—requires maintenance both to ensure a watertight seal and to lengthen its service life; the type and frequency of maintenance varies with the roofing material. Older chimneys and parapets also require inspection and maintenance. With the exception of cleaning and minor repairs to gutters and downspouts, most roof maintenance work will necessitate use of an outside contractor.

Inspection:

The functioning of gutters and downspouts can be safely observed from the ground during rainy weather and when winter ice has collected. Binoculars are a useful tool in helping to identify potential roofing problems from the same safe vantage point. Careful observation from grade helps to identify maintenance needs between close-up inspections by an experienced roofer. Observation from the building interior is also important to identify possible leak locations. When access can be safely gained to the roof, it is important to wear shoes with slip-resistant soles and to use safety ropes.

Figure 3. Keeping gutters clean of debris can be one of the most important cyclical maintenance activities. On this small one-story addition, a garden hose is being used to flush out the trough to ensure that the gutter and downspouts are unobstructed. Gutters on most small and medium size buildings can be reached with an extension ladder and a garden hose. Photo: Bryan Blundell.

Depending on the nature of the roof, some common conditions of concern to look for are:

- sagging gutters and split downspouts;
- debris accumulating in gutters and valleys;
- overhanging branches rubbing against the roof or gutters
- plant shoots growing out of chimneys;
- slipped, missing, cracked, bucking, delaminating, peeling, or broken roof coverings;
- deteriorated flashing and failing connections at any intersection of roof areas or of roof and adjacent wall;
- bubbled surfaces and moisture ponding on flat or low sloped roofs;
- evidence of water leaks in the attic;
- misaligned or damaged elements, such as decorative cresting, lightning rods, or antennas; and
- cracked masonry or dislodged chimney caps.

Maintenance:

- Remove leaves and other debris from gutters and downspouts. Utilize a ladder with a brace device, if necessary, to keep the ladder from crushing the gutter. Use a garden hose to flush out troughs and downspouts. Patch or repair holes in gutters using products such as fiberglass tape and epoxy adhesive in metal gutters. Avoid asphalt compounds since acidic material can cause further deterioration of metal gutters.
- Correct misaligned gutters and adjust, if necessary, so that water flows to drains and does not pond. If gutter edges sag, consider inserting wooden wedges between the fascia board and the back of the gutter to add support. Seal leaking seams or pinholes in gutters and elbows.
- Broom sweep branch or leaf debris away from shingles, valleys, and crickets, particularly around chimneys and dormers.
- Where mechanical equipment is mounted on flat or low-sloped roofs, ensure that access for maintenance can be provided without damaging the roof. Clean out trapped leaves and debris from around equipment base and consider adding a protective walkway for access.
- Remove biological growth where it is causing erosion or exfoliation of roofing. Use low-pressure garden hose water and a natural or nylon scrubbing brush to remove such growth, scraping with a plastic putty knife or similar wood or plastic tool as needed on heavier buildup. Most growth is acidic and while there are products designed to kill spores, such as diluted chlorine bleach, they should be avoided. Even fairly weak formulas can still cause unexpected color changes, efflorescence, or over-splash damage to plantings or surfaces below the roof. Where appropriate, trim adjacent tree branches to increase sunlight on the roof since sunlight will deter further biological growth.
- Re-secure loose flashing at the dormers, chimneys or parapets. Clean out old mortar, lead, lead wool, or fastening material and make sure that flashing is properly inserted into reglet (slot) joints, taking care not to damage the substrate. Avoid installing new step flashing as a single metal component where multiple pieces are required to provide proper waterproofing. Also avoid attaching step flashing with mastic or sealant. Properly re-bed all step flashing. Use appropriate non-ferrous flashing metal or painted metal if needed. Since cap, step, valley, cricket, and apron flashings each have specific overlap and extension requirements, replacement flashing should match the existing material unless there has been a proven deficiency.

Figure 4. Damage to roofs often requires immediate attention. As a temporary measure, this damaged roof tile could be replaced with a brown aluminum sheet wedged between the existing tiles. Photo: Chad Randl.

Figure 5. The use of a sealant to close an exposed joint is not always an effective long-term solution. Where this decorative wood element connects to the slate roof, the sealant has failed within a short time and a proper metal flashing collar is being fitted instead. Photo: Bryan Blundell.

- Repoint joints in chimneys, parapet, or balustrade capping stones using a hydraulic lime mortar or other suitable mortar where the existing mortar has eroded or cracked, allowing moisture penetration. In general, a mortar that is slightly weaker than the adjacent masonry should be used. This allows trapped moisture in the masonry to migrate out through the mortar and not the masonry. Spalled masonry is often evidence of the previous use of a mortar mix that was too hard.
- Use professional services to repair chimneys and caps. Avoid the use of mortar washes on masonry since they tend to crack, allowing moisture to penetrate and promoting masonry spalling. Repoint masonry with a durable mortar that is slightly weaker than the adjacent masonry. Slope the masonry mortar cap to insure drainage away from the flue. If a chimney rain cap is installed, ensure adequate venting and exhaust.
- As a temporary measure, slip pieces of non-corrosive metal flashing under or between damaged and missing roofing units until new slate, shingles, or tile can be attached. Repair broken, missing or damaged roofing units with ones that match. Follow roofing supplier and industry guidance on inserting and attaching replacement units (Fig 4). Avoid using temporary asphalt patches as it makes a proper repair difficult later on.
- For long-term preservation of wooden shingle roofs coated with a preservative, recoat every few years following the manufacturer's recommendations. Be aware of environmental considerations.
- Scrape and repaint selected areas of coated ferrous metal roofing as needed; repaint on a regularly scheduled basis. Ferrous metal roofs can last a long time if painted regularly. Alkyd coatings are generally used on metal roofs; be sure to wash and properly prepare the area beforehand. Environmental regulations may restrict the use of certain types of paints. Apply the coating system in accordance with manufacturer's recommendations. Prepare the surface prior to application to obtain good adhesion with the prime coat. Apply both a prime coat and a topcoat for good bonding and coverage; select primer and topcoat products from the same manufacturer.
- Re-secure loose decorative elements, such as finials and weathervanes. Seek professional advice if decorative elements exhibit considerable corrosion, wood rot, or structural instability. Small surface cracks may benefit from a flexible sealant to keep moisture out; sealants have a limited life and require careful inspection and periodic replacement (Fig 5).

Exterior Walls

Exterior walls are designed to help prevent water infiltration, control air infiltration, and serve as a barrier for unwanted animals, birds and insects. The primary maintenance objective is to keep walls in sound condition and to prevent water penetration, insect infestation, and needless decay (Fig 6). Depending on the materials and construction methods, walls should have an even appearance, free from unwanted cracks, and should be able to shed excess moisture. Where surfaces are significantly misaligned or where there are bulging wall sections or cracks indicative of potential structural problems, seek professional guidance as to the cause of distress and appropriate corrective measures. Wood-frame construction generally will require more frequent maintenance than buildings constructed of brick, stone, or terra cotta (Fig 7).

Inspections:

It is best to inspect walls during dry as well as wet weather. Look for moisture patterns that may appear on the walls after a heavy or sustained rainfall or snow, recording any patterns on elevation drawings or standard recording forms. Monitoring the interior wall for moisture or other potential problems is important as well. Look for movement in cracks, joints, and around windows and doors and try to establish whether movement is seasonal in nature (such as related to shrinkage of wood during dry weather) or signs of an ongoing problem. For moderate size buildings, a ladder or mechanical lift may be necessary, though in some cases the use of binoculars and observations made from windows and other openings will be sufficient. When examining the walls, some common conditions of concern to look for are:

- Misaligned surfaces, bulging wall sections, cracks in masonry units, diagonal cracks in masonry joints, spalling masonry, open joints, and nail popping;
- Evidence of wood rot, insect infestation, and potentially damaging vegetative growth;
- Deficiencies in the attachment of wall mounted lamps, flag pole brackets, signs, and similar items;
- Potential problems with penetrating features such as water spigots, electrical outlets, and vents;
- Excessive damp spots, often accompanied by staining, peeling paint, moss, or mold; and
- General paint problems (Fig 8).

Maintenance:

- Trim tree branches away from walls. Remove ivy and tendrils of climbing plants by first cutting at the base of the vine to allow tendrils to die back, and later using a plastic scraper to dislodge debris and an appropriate digging tool to dislodge and remove root systems. Be cautious if using a commercial chemical to accelerate root decay; follow safety directions and avoid contact of chemicals with workers and wall materials.
- Wash exterior wall surfaces if dirt or other deposits are causing damage or hiding deterioration; extend

Figure 6. Stucco applied to an exterior wall or foundation was intended to function as a watertight surface. Unless maintained, rainwater will penetrate open joints and cracks that may occur over time. A spalled section of stucco indicates some damage has occurred and a wooden mallet is being used to tap the surface to determine whether the immediate stucco has lost adhesion. Photo: Bryan Blundell.

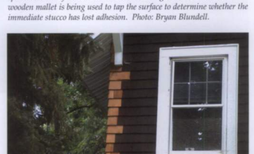

Figure 7. One of the advantages of wood shingles as a wall covering is that individual shingles that are damaged can easily be replaced. On this highly exposed corner, worn shingles have been selectively replaced to help safeguard against water damage. The new shingles will be stained to match the existing shingles.

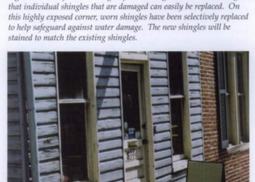

Figure 8. The paint on the siding of this south-facing wall needs to be scraped, sanded, primed and repainted. Postponing such work will lead to further paint failure, require greater preparatory costs, and could even result in the need to replace some siding. Photo: Charles Fisher.

Figure 9. To help extend a repainting cycle, dirt and spider webs should be removed before permanent staining occurs. In this case, a natural bristle brush and a soft damp cloth are being used to remove insect debris and refresh the surface appearance.

scheduled times for cleaning for cosmetic purposes to reduce frequency (Fig 9). When cleaning, use the gentlest means possible; start with natural bristle brushes and water and only add a mild phosphate-free detergent if necessary. Use non-abrasive cleaning methods and low-pressure water from a garden hose. For most building materials, such as wood and brick, avoid abrasive methods such as mechanical scrapers and high-pressure water or air and such additives as sand, natural soda, ice crystals, or rubber products. All abrasives remove some portion of the surface and power-washing drives excessive moisture into wall materials and even into wall cavities and interior walls. If using a mild detergent, two people are recommended, one to brush and one to prewet and rinse. When graffiti or stains are present, consult a preservation specialist who may use poultices or mild chemicals to remove the stain. If the entire building needs cleaning other than described above, consult a specialist.

- Repoint masonry in areas where mortar is loose or where masonry units have settled. Resolve cause of cracks or failure before resetting units and repointing. Rake out joints by hand, generally avoiding rotary saws or drills, to a depth of 2 ½ times the width of the joint (or until sound mortar is encountered), to make sure that fresh mortar will not pop out. Repointing mortar should be lime-rich and formulated to be slightly weaker than the masonry units and to match the historic mortar in color, width, appearance, and tooling. Off-the-shelf pre-mixed cement mortars are not appropriate for most historic buildings. Avoid use of joint sealants in place of mortar on vertical masonry wall surfaces, as they are not breathable and can lead to moisture-related damage of the adjacent masonry (Fig 10).
- Correct areas that trap unwanted moisture. Damaged bricks or stone units can sometimes be removed, turned around, and reset, or replaced with salvaged units. When using traditional or contemporary materials for patching wood, masonry, metal, or other materials, ensure that the materials are compatible with the substrate; evaluate strength, vapor permeability, and thermal expansion, as well as appearance.
- When patching is required, select a compatible patch material. Prepare substrate and install patch material according to manufacturer's recommendations; respect existing joints. Small or shallow surface defects may not require patching; large or deep surface defects may be better addressed by installation of a dutchman unit than by patching.
- Where a damaged area is too large to patch, consider replacing the section with in-kind material. For stucco and adobe materials, traditional patching formulas are recommended.
- When temporarily removing wood siding to repair framing or to tighten corner boards and loose trim, reuse the existing siding where possible. Consider using stainless steel or high strength aluminum nails as appropriate. Putty or fill nail holes flush with siding prior to repainting. Back-prime any installed wood with

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Figure 10. Repointing of masonry should usually be approached as repair rather than maintenance work in part because of the need for a skilled mason familiar with historic mortar. In this case, a moisture condition was not corrected and the use of a waterproof coating and off-the-shelf Portland cement mortar trapped water and resulted in further damage to these 19th century bricks. Photo: NPS files.

one coat of primer and coat end grain that might be exposed with two coats of primer.

• Prepare, prime, and spot paint areas needing repainting. Remember that preparation is the key to a successful long lasting paint job. Ensure beforehand the compatibility of new and existing paints to avoid premature paint failure. Remove loose paint to a sound substrate; sand or gently rough surface if needed for a good paint bond; wipe clean; and repaint with appropriate primer and topcoats. Follow manufacturer's recommendations for application of coatings, including temperature parameters for paint application. Use top quality coating materials. Generally paint when sun is not shining directly onto surfaces to be painted.

• Remove deteriorated caulks and sealants, clean, and reapply appropriate caulks and sealants using backer rods as necessary. Follow manufacturer's instructions regarding preparation and installation.

• Correct deficiencies in any wall attachments such as awning and flag pole anchors, improperly installed electrical outlets, or loose water spigots.

Openings

Exterior wall openings primarily consist of doors, windows, storefronts, and passageways. The major maintenance objectives are to retain the functioning nature of the opening and to keep in sound condition the connection between the opening and the wall in order to reduce air and water infiltration.

Inspection:

Wall openings are typically inspected from inside as well as out. Examinations should include the overall material condition; a check for unwanted water penetration, insect infiltration, or animal entry; and identification of where openings may not be properly functioning. Frames should be checked to make sure they are not loose and to ascertain whether the intersection between the wall and the frame is properly sealed. Secure connections of glazing to sash and between sash and frames are also important. Particular attention should be placed on exposed horizontal surfaces of storefronts and window frames as they tend to deteriorate much faster than vertical surfaces. Inspections should identify:

- loose frames, doors, sash, shutters, screens, storefront components, and signs that present safety hazards;
- slipped sills and tipped or cupped thresholds;
- poorly fitting units and storm assemblies, misaligned frames, drag marks on thresholds from sagging doors and storm doors;
- loose, open, or decayed joints in door and window frames, doors and sash, shutters, and storefronts;
- loose hardware, broken sash cords/chains, worn sash pulleys, cracked awning, shutter and window hardware, locking difficulties, and deteriorated weatherstripping and flashing;
- broken/cracked glass, loose or missing glazing and putty;
- peeling paint, corrosion or rust stains; and
- window well debris accumulation, heavy bird droppings, and termite and carpenter ant damage.

Maintenance:

• Replace broken or missing glass as soon as possible; in some cases cracked glass may be repaired using specialty glues. For historic crown glass and early cylinder glass, a conservation approach should be considered to repair limited cracks. Where panes with a distinct appearance are missing, specialty glass should be obtained to match, with sufficient inventory kept for future needs. Avoid using mechanical devices to remove old putty and match historic putty bevels or details when undertaking work.

• Reputty window glazing where putty is deteriorated or missing. Take care in removing putty so as not to crack or break old glass or damage muntins and sash frames. Re-glaze with either traditionally formulated

Figure 11. Glazing putty should be maintained in sound condition to prevent unwanted air infiltration and water damage. New glazing putty should be pulled tight to the glass and edge of the wood, creating a clean bevel that matches the historic glazing.

oil putties or modern synthetic ones, making sure to properly bed the glass and secure with glazing points (Fig 11).

• Clean window glass, door glazing, storefronts, transom prism lights, garage doors, and storm panels using a mild vinegar and water mixture or a non-alkaline commercial window cleaner. Be cautious with compounds that contain ammonia as they may stain brass or bronze hardware elements if not totally removed. When using a squeegee blade or sponge, wipe wet corners with a soft dry cloth. Avoid high-pressure washes.

• Clean handles, locks and similar hardware with a soft, damp cloth. Use mineral spirits or commercial cleaners very sparingly, as repeated use may remove original finishes. Most metal cleaners include ammonia that can streak and stain metal, so it is important to remove all cleaning residue. Polished hardware subject to tarnishing or oxidation, particularly doorknobs, often benefits from a thin coat of paste wax (carnauba), hand buffed to remove extra residue. Avoid lacquer finishes for high use areas, as they require more extensive maintenance. Patinated finishes should not be cleaned with any chemicals, since the subtle aged appearance contributes to the building's character.

• Remove and clean hardware before painting doors and windows; reinstall after the paint has dried.

• Tighten screws in doorframes and lubricate door hinges, awning hardware, garage door mechanisms, window sash chains, and pulleys using a graphite or silicone type lubricant.

Contracting Maintenance and Repair Work

Many contractors are very proficient in using modern construction methods and materials; however, they may not have the experience or skill required to carry out maintenance on historic buildings. The following are tips to use when selecting a contractor to work on your historic building:

1. Become familiar with work done on similar historic properties in your area so that you can obtain names of possible preservation contractors.
2. Be as specific as possible in defining the scope of work you expect to undertake.
3. Ask potential contractors for multiple references (three to five) and visit previous work sites. Contact the building owner or manager and ask how the job proceeded; if the same work crew was retained from start to finish; if the workers were of a consistent skill level; whether the project was completed in a reasonable time; and whether the person would use the contractor again.
4. Be familiar with the preservation context of the work to be undertaken. Use the written procedures in your maintenance plan to help define the scope of work in accordance with preservation standards and guidelines. Always request that the gentlest method possible be used. Use a preservation consultant if necessary to ensure that the work is performed in an appropriate manner.
5. Request in the contract proposal a detailed cost estimate that clearly defines the work to be executed, establishes the precautions that will be used to protect adjoining materials, and lists specific qualified subcontractors, if any, to be used.
6. Insure that the contractor has all necessary business licenses and carries worker compensation.

• Check weather stripping on doors and windows and adjust or replace as necessary. Use a durable type of weather stripping, such as spring metal or high quality synthetic material, avoiding common brush and bulb or pile weather stripping that require more frequent replacement.

• Adjust steel casement windows as needed for proper alignment and tight fit. Avoid additional weather stripping as this may lead to further misalignment, creating pathways for air and water infiltration.

• Check window sills for proper drainage. Fill cracks in wood sills with a wood filler or epoxy. Follow manufacturer's instructions for preparation and installation. Do not cover over a wood sill with metal panning, as it may trap moisture and promote decay.

• Repair, prime, and repaint windows, doors, frames, and sills when needed. Clean out putty debris and paint chips from windows using a wet paper towel and dispose of debris prior to repair or repainting. Take appropriate additional precautions when removing lead-based paint. Sand and prepare surfaces and use material-specific patching compounds to fill any holes or areas collecting moisture (Fig 12). Avoid leaving exposed wood unpainted for any length of time, as light will degrade the wood surface and lead to premature failure of subsequent paint applications. Immediately prime steel sash after paint is removed and the substrate prepared for repainting.

Figure 12. Good surface preparation is essential for long lasting paint. Scraping loose paint, filling nail holes and cracks, sanding, and wiping with a damp cloth prior to repainting are all important steps whether touching up small areas or repainting an entire feature. Always use a manufacturer's best quality paint. Windows and shutters may need repainting every five to seven years, depending on exposure and climate.

• Adjust wood sash that bind when operated. Apply beeswax, paraffin, or similar material to tracks or sash runs for ease of movement. If sash are loose, replace worn parting beads. Sash runs traditionally were unpainted between the stop and parting bead; removing subsequent paint applications will often help improve sash operation.

• Correct perimeter cracks around windows and doors to prevent water and air infiltration. Use traditional material or modern sealants as appropriate. If fillers such as lead wool have been used, new wool can be inserted with a thin blade tool, taking care to avoid damage to adjacent trim. Reduce excess air infiltration around windows by repairing and lubricating sash locks so that windows close tightly.

Figure 13. Window air conditioning units can cause damage to surfaces below when condensation drips in an uncontrolled manner. Drip extension tubes can sometimes be added to direct the discharge.

• Remove debris beneath window air conditioning units and ensure that water from units does not drain onto sills or wall surfaces below (Fig 13). Removal of air conditioning units when not in season is recommended.

• Adjust storm panels and clean weep holes; check that weep holes at the bottom of the panels are open so water will not be trapped on the sill. Exterior applied storm windows are best attached using screws and not tightly adhered with sealant. Use of sealant makes storm units difficult to remove for maintenance and can contribute to moisture entrapment if weep holes become clogged.

• Remove weakened or loose shutters and store for later repair. Consider adding a zinc or painted metal top to shutters as a protective cap to cover the wood's exposed end grain. This will extend the life of the shutters.

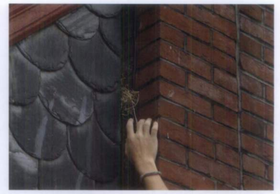

Figure 14. When inspecting connections between projections and the main building, look for areas where birds, bees and pests may enter or nest. Birds have been nesting in this porch roof and the area is being cleaned of their debris. Where an opening exists, it may be necessary to cover it with a trim piece, screening, or sealant. Photo: Bryan Blundell.

Projections

Numerous projections may exist on a historic building, such as porches, dormers, skylights, balconies, fire escapes, and breezeways. They are often composed of several different materials and may include an independent roof. Principal maintenance objectives include directing moisture off these features and keeping weathered surfaces in good condition. Secondary projections may include brackets, lamps, hanging signs, and similar items that tend to be exposed to the elements.

Inspection:

In some cases, projections are essentially independent units of a building and so must be evaluated carefully for possible settlement, separation from the main body of the building, and materials deterioration. Some electrical features may require inspection by a electrician or service technician. Common conditions of concern to look for are:

- damaged flashing or tie-in connections of projecting elements;
- misaligned posts and railings;
- deteriorated finishes and materials, including peeling paint, cupped and warped decking, wood deterioration, and hazardous steps;
- evidence of termites, carpenter ants, bees, or animal pests (Fig 14);
- damaged lamps, unsafe electrical outlets or deteriorated seals around connections;
- loose marker plaques, sign, or mail boxes; and
- rust and excessive wear of structural, anchorage, and safety features of balconies and fire escapes.

Maintenance:

• Selectively repair or replace damaged roofing units on porches and other projections. Ensure adequate drainage away from the building. Repair flashing connections as needed; clean and seal open joints as appropriate.

• Secure any loose connections, such as on porch rails or fire escapes.

• Maintain ferrous metal components by following manufacturer's recommendation for cleaning and repainting. Remove rust and corrosion from porch handrails, balconies, fire escapes, and other metal features; prepare, prime, and repaint using a corrosion-inhibitive coating system. Apply new primer before new corrosion sets in, followed by new topcoat. Take appropriate safety measures when dealing with existing lead-based paint and in using corrosion-removal products (Fig 15).

• Reattach loose brackets, lamps, or signs. With electrical boxes for outlets or lighting devices, ensure that cover plates are properly sealed. Prime and paint metal elements as needed.

• Keep porch decks and steps free from dust, dirt, leaf debris, and snow as soon at it accumulates using a broom or plastic blade shovel.

• Repair areas of wood decay or other damage to railings, posts, and decorative elements. Repair with wood dutchman, wood putty, or epoxy filler, as appropriate; replace individual elements as needed.

Figure 15. Metal projecting elements on a building, such as sign armatures and railings, are easily subject to rust and decay. Proper surface preparation to remove rust is essential. Special metal primers and topcoats should be used.

Prime and repaint features when necessary and repaint horizontal surfaces on a more frequent basis.

• Sand and repaint porch floorboards to keep weather surfaces protected. The exposed ends of porch floorboards are especially susceptible to decay and may need to be treated every year or two.

• Carefully cut out damaged or buckled porch flooring and replace with wood to match. Back-prime new wood that is being installed; treat end grain with wood preservative and paint primer. Ensure that new wood is adequately kiln or air-dried to avoid shrinkage and problems with paint adherence.

• Repair rotted stair stringers; adjust grade or add stone pavers at stair base to keep wooden elements from coming into direct contact with soil.

• Consider durable hardwoods for replacement material where beading, chamfering, or other decorative work is required in order to match existing features being replaced. Although appropriate for certain applications, pressure treated lumber is hard to tool and may inhibit paint adherence if not allowed to weather prior to coating application.

• Clean out any debris from carpenter bees, ants, termites, and rodents, particularly from under porches. Replace damaged wood and add screening or lattice to discourage rodents. Consider treating above ground features with a borate solution to deter termites and wood rot and repaint exposed surfaces.

Foundations and Perimeter Grades

The foundation walls that penetrate into the ground, the piers that support raised structures, and the ground immediately around a foundation (known as grade) serve important structural functions. To help sustain these functions, it is important that there is good drainage around and away from the building. The maintenance goal is to prevent moisture from entering foundations and crawl spaces and damaging materials close to the grade, and to provide ventilation in damp areas.

Inspection:

Inspections at the foundation should be done in conjunction with the inspection of the downspouts to ensure that water is being discharged a sufficient distance from the building perimeter to avoid excessive dampness in basements or crawl spaces. In addition, crawl spaces should be adequately vented to deter mold and decay and should be screened or otherwise secured against animals. Look for:

- depressions or grade sloping toward the foundation; standing water after a storm;

Figure 16. This chronically wet area has a mildew bloom brought on by heat generated from the air-conditioning condenser unit. The dampness could be caused be a clogged roof gutter, improper grading, or a leaking hose bibb.

Sealants and Caulks

Using sealants and caulks has become a familiar part of exterior maintenance today. As the use of precision joinery and certain traditional materials to render joints more weathertight has waned in recent years, caulks and more often elastomeric sealants are used to seal cracks and joints to keep out moisture and reduce air infiltration. Where cracks and failing joints are indicators of a serious problem, sealants and caulks may be used as a temporary measure. In some cases they may actually exacerbate the existing problem, such as by trapping moisture in adjacent masonry, and lead to more costly repairs.

Manufacturer's recommendations provide instructions on the proper application of caulks and sealants. Special attention should be placed on ensuring that the subsurface or joint is properly prepared and cleaned. Backer rods may be necessary for joints or cracks. Tooling of the caulk or sealant is usually necessary to ensure contact with all edge surfaces and for a clean and consistent appearance.

Caulks generally refer to older oil resin-based products, which have relatively limited life span and limited flexibility. Contemporary elastomeric sealants are composed of polymer synthetics. Elastomeric sealants are more durable than caulks and have greater flexibility and wider application. Caulks and sealants can become maintenance problems, as they tend to deteriorate faster than their substrates and must be replaced periodically as a part of cyclical maintenance of the structure.

The selection criteria for caulks and sealants include type of substrate, adhesion properties, size and configuration of joint, intended appearance/color and paintability, movement characteristics, and service life. Both one-part and two-part sealants are available; the latter require mixing as part of the application process. Sealants are commonly used for a variety of places on the exterior of a building such as around windows and doors, at interfaces between masonry and wood, between various wood features or elements, and at attachments to or through walls or roofs, such as with lamps, signs, or exterior plumbing fixtures. Their effectiveness depends on numerous factors including proper surface preparation and application. Applications of sealants and caulks should be examined as part of routine maintenance inspection, irrespective of their projected life expectancy.

Installation of caulks and sealants often can be undertaken by site personnel. For large and more complex projects, a contactor experienced in sealant installation may be needed. In either case, the sealant manufacturer should be consulted on proper sealant selection, preparation, and installation procedures.

- material deterioration at or near the foundation, including loss of mortar in masonry, rotting wood clapboards, or settlement cracks in the lower sections of wall;
- evidence of animal or pest infestation;
- vegetation growing close to the foundation, including trees, shrubs and planting beds;
- evidence of moisture damage from lawn and garden in-ground sprinkler systems;
- evidence of moss or mold from damp conditions or poorly situated downspout splash blocks (Fig 16); and
- blocked downspout drainage boots or clogged areaway grates.

Maintenance:

• Remove leaves and other debris from drains to prevent accumulation. Detach drain grates from paved areas and extract clogged debris. Flush with a hose to ensure that there is no blockage. Use a professional drain service to clear obstructions if necessary.

• Conduct annual termite inspections. Promptly address termite and other insect infestations. Use only licensed company for treatment where needed.

• Keep the grade around the foundation sloping away from the building. Add soil to fill depressions particularly around downspouts and splash blocks. Make sure that soil does not come too close to wooden or metal elements. A 6" separation between wooden siding and the grade is usually recommended.

• Avoid use of mulching material immediately around foundations as such material may promote termite infestation, retain moisture or change existing grade slope.

• Reset splash blocks at the end of downspouts or add extender tubes to the end of downspouts as necessary (Fig 17).

• Lubricate operable foundation vent grilles to facilitate seasonal use; paint as needed.

• Manage vegetation around foundations to allow sufficient air movement for wall surfaces to dry out during damp periods. Trim plantings and remove weeds and climbing vine roots. Be careful not to scar foundations or porch piers with grass or weed cutting equipment. If tree roots appear to be damaging a foundation wall, consult an engineer as well as a tree company.

• Wash off discoloration on foundations caused by splash-back, algae, or mildew. Use plain water and a soft natural or nylon bristle brush. Unless thoroughly researched and tested beforehand on a discreet area of the wall, avoid chemical products that may discolor certain types of stone. If cleaning products are used, test beforehand in a discreet area; and avoid over splash to plantings and adjacent building materials.

• Selectively repoint unit masonry as needed. Follow guidance under the wall section in regard to compatible mix, appearance, and texture for pointing mortar.

• Avoid using salts for de-icing and fertilizers with a high acid or petro-chemical content around foundations, as these materials can cause salt contamination of masonry. Use sand or organic materials without chloride additives that can damage masonry. Where salt is used on icy walks, distribute it sparingly and sweep up residual salt after walks have dried.

• Use snow shovels and brooms to clean snow from historic paths and walkways. Avoid blade-type snow removers as they may chip or abrade cobblestones, brick, or stone paving. Note that use of steel snow removal tools in areas where salt-containing snow melters are used may result in rust staining from steel fragments left on the paving.

Figure 17. Extending downspouts at their base is one of the basic steps to reduce dampness in basements, crawl spaces and around foundations. Extensions should be buried, if possible, for aesthetics, ease of lawn care, and to avoid creating a tripping hazard. Photo: NPS files.

Conclusion

Maintenance is the most important preservation treatment for extending the life of a historic property. It is also the most cost effective. Understanding the construction techniques of the original builders and the performance qualities of older building materials, using traditional maintenance and repair methods, and selecting in-kind materials where replacements are needed will help preserve the building and its historic character.

Maintenance can be managed in small distinct components, coordinated with other work, and scheduled over many years to ensure that materials are properly cared for and their life span maximized. A written maintenance plan is the most effective way to organize, schedule, and guide the work necessary to properly care for a historic building. The maintenance plan should include a description of the materials and methods required for each task, as well as a schedule for work required for maintenance of different building materials and components.

Historic house journals, maintenance guides for older buildings, preservation consultants, and preservation maintenance firms can assist with writing appropriate procedures for specific properties. Priorities should be established for intervening when unexpected damage occurs such as from broken water pipes or high winds. Worker safety should always be paramount. When work is beyond the capabilities of in-house personnel and must be contracted, special efforts should be made to ensure that a contractor is both experienced in working with historic buildings and utilizes appropriate preservation treatments.

A well-maintained property is a more valuable property and one that will survive as a legacy for generations to come.

Endnotes

1. *The Secretary of the Interior's Standards for the Treatment of Historic Properties.* Washington, D.C.: U.S. Department of the Interior, National Park Service, 1995.

2. Committee on Advanced Maintenance Concepts for Buildings et al, *Committing to the Cost of Ownership: Maintenance and Repair of Public Buildings*, Washington, D.C.: National Academy Press, 1990.

Further Reading

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Acknowledgements

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This publication has been prepared pursuant to the National Historic Preservation Act, as amended, which directs the Secretary of the Interior to develop and make available information concerning historic properties. Comments about this publication should be made to: Charles Fisher, Technical Publications Program Manager, Technical Preservation Services-2255, National Park Service, 1849 C Street, NW, Washington, D.C. 20240. Additional information offered by Technical Preservation Services is available on our website at <www.nps.gov/history/hps/tps>. This publication is not copyrighted and can be reproduced without penalty. Normal procedures for credit to the author and the National Park Service are appreciated. Unless otherwise noted, photographs in this Brief are by Sharon C. Park, FAIA. Except for the author's photos, the photographs used in this publication may not be used to illustrate other publications without permission of the owner.

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TOWN OF LAKE PARK WELCOME

Historical Resources

Town Hall Structural Roof Replacement & Exterior Restoration

535 Park Avenue, Lake Park, FL 33403

NO.	DATE	DESCRIPTION

DATE:	04.10.2023
MODELED:	LA
CHECKED:	BL/ REG
REG PROJECT #:	22029

HG - EXTERIOR MAINTANCE

Construction Document Set

A-34

GENERAL NOTES

1. CONTRACTOR SHALL MAKE A SITE VISIT PRIOR TO SUBMITTING A BID FOR THE PROJECT. PRIOR TO THE START OF CONSTRUCTION THE CONTRACTOR SHALL VERIFY THE SITE EXISTING CONDITIONS.
2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS REQUIRED FOR RESTORATION.
3. ALL WORK PERFORMED UNDER THE CONTRACT SHALL COMPLY WITH THE REQUIREMENTS OF THESE PLANS & ACCOMPANYING PROJECT SPECIFICATIONS, & ALL REFERENCES CITED WITHIN THE PROJECT SPECIFICATIONS. THE CONTRACT WITH THE OWNER SHALL GOVERN & SUPERCEDE OVER REFERENCED SPECIFICATIONS. MEANS OF MEASUREMENT & PAYMENT SHALL BE AS SET FORTH BY THE OWNER & STATED IN THE CONTRACT.
4. THESE NOTES ARE INTENDED TO ADD CLARIFICATION & SUPPLEMENT PROJECT SPECIFICATIONS, & ARE NOT INTENDED TO REPLACE SPECIFICATIONS. SEE PROJECT SPECIFICATIONS ADDITIONAL REQUIREMENTS TO THESE NOTES.
5. ANY & ALL SAFETY REGULATIONS ARE TO BE STRICTLY ADHERED TO. METHODS OF CONSTRUCTION & INSTALLATION OF STRUCTURAL ELEMENTS & CONSTRUCTION MATERIAL ARE THE RESPONSIBILITY OF THE CONTRACTOR.
6. THE CONTRACTOR SHALL MAINTAIN A CLEAN & SAFE JOB SITE. DEMOLISHED MATERIALS & CONSTRUCTION-GENERATED DEBRIS SHALL BE REMOVED DAILY. DISPOSAL OF SAID MATERIALS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. CONSTRUCTION DEBRIS SHALL BE DISPOSED OF IN AN APPROVED SANITARY LANDFILL.
7. AS PART OF PERMIT CONDITIONS, THE CONTRACTOR MAY BE REQUIRED TO EMPLOY CONSTRUCTION DEBRIS CONTROL MEASURES SUCH AS FENCES & OTHER DEVICES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEAN-UP OF ANY PROJECT-GENERATED DEBRIS LOCATED OUTSIDE THE IMMEDIATE WORK AREA.
8. THE CONTRACTOR SHALL ABIDE BY ALL APPLICABLE LOCAL, STATE, AND FEDERAL ENVIRONMENTAL PROTECTION STANDARDS, LAWS, & REGULATIONS.
9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REPORT IMMEDIATELY TO THE ENGINEER ANY & ALL UNEXPECTED OBSTACLES, OBSTRUCTIONS, DEBRIS, CONDUITS, CABLES, PIPELINES, TANKS, OR ARTIFACTS UNEARTHED DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR BRINGING ALL FACETS OF THE PROJECT IN COMPLIANCE WITH & IN CONFORMANCE WITH THESE PLANS & SPECIFICATIONS. IF ANY MODIFICATIONS TO THE PLAN IS DEEMED NECESSARY BY THE CONTRACTOR, THE CONTRACTOR SHALL SUBMIT PROPOSED CHANGES IN WRITING TO THE ENGINEER FOR APPROVAL.
11. THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES IN THE AREA OF CONSTRUCTION PRIOR TO COMMENCING WITH CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT PROJECT ELEMENTS CONFLICT WITH UTILITIES.
12. THE CONTRACTOR SHALL REMOVE ALL CONSTRUCTION EQUIPMENT, STAGING & OTHER TEMPORARY STRUCTURES AT THE COMPLETION OF THE PROJECT.
13. IF DURING PROJECT CONSTRUCTION ANY DAMAGE TO STATE, COUNTY, OR LOCAL INFRASTRUCTURE INCLUDING, BUT NOT LIMITED TO ROADS, SIDEWALKS, & UTILITIES IS CAUSED BY CONSTRUCTION ACTIVITIES RELATED TO THIS PROJECT, REPAIRS SHALL BE MADE BY THE CONTRACTOR & APPROVED BY THE ENGINEER.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADHERING TO ALL CONDITIONS OF ENVIRONMENTAL & BUILDING PERMITS CONDITIONS & COMPLYING TO REQUITE REPORTING REQUIREMENTS.

DEMOLITION NOTES

1. DO NOT SAW CUT ANY STRUCTURAL COMPONENT OF OR DO ANY WORK THAT MAY IN ANY MANNER DIMINISH THE STRUCTURAL INTEGRITY OF THE EXISTING BEAMS, JOISTS, COLUMNS, OR CONC. SLABS; OR THE BUILDING IN GENERAL.

2. THE DEMOLITION INDICATED IS INTENDED TO SHOW THE GENERAL SCOPE OF DEMOLITION WORK & IS DIAGRAMMATIC IN NATURE. G.C. TO PERFORM ALL WORK REQUIRED FOR THE SATISFACTORY COMPLETION OF THE INTENT OF THE SCOPE OF WORK INDICATED IN THE DRAWINGS. THE INTENT OF THE DRAWINGS IS TO COMPLETE ALL DEMOLITION AS REQUIRED TO COMPLETE THE PROPOSED NEW CONSTRUCTION & THE G.C. SHALL BE RESPONSIBLE FOR SUCH.

3. THE CODES HAVING JURISDICTION SHALL BE OBSERVED STRICTLY IN THE DEMOLITION ON THE PROJECT, INCLUDING ALL APPLICABLE STATE, CITY, COUNTY BUILDING, ZONING, ELECTRICAL, MECHANICAL, PLUMBING, LIFE SAFETY AND FIRE CODES. CONTRACTOR SHALL VERIFY ALL CODE REQUIREMENTS & THE DEMOLITION DOCUMENTS & BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED DEMOLITION & TRADE PERMITS & THEIR RESPECTIVE COSTS.

5. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO DEMOLITION &/OR CONTRACT NEGOTIATIONS & SHALL VERIFY EXISTING CONDITIONS WITH THE DEMOLITION DOCUMENTS. DISCREPANCIES BETWEEN DEMOLITION DOCUMENTS (& THEIR INTENT) SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION FOR CLARIFICATION. BIDS SHALL NOT BE SUBMITTED OR CONTRACTS NEGOTIATED BY THE CONTRACTOR PRIOR TO CLARIFICATION OF THE INTENT OF THE DEMOLITION DOCUMENTS WHERE SUCH INTENT IS IN DOUBT.

6. THE CONTRACTOR SHALL MAINTAIN THE PREMISE CLEAN & FREE OF TRASH DEBRIS & SHALL PROTECT ALL ADJACENT WORK FROM DAMAGE, SOILING, ETC. ALL REMAINING FACILITIES SHALL BE LEFT CLEAN & READY FOR CONSTRUCTION UPON COMPLETION OF DEMOLITION.

7. SHUTOFF, CAP & OTHERWISE PROTECT PUBLIC UTILITY LINES IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC AGENCY OR UTILITY HAVING JURISDICTION.

8. USE THE MEANS NECESSARY TO PREVENT DUST FROM BECOMING A NUISANCE.

9. G.C. TO PATCH & REPAIR GWB AT ALL LOCATIONS WHERE THE EXISTING SURFACE IS NOT STRAIGHT & TRUE.

10. ALL AREAS AFFECTED / DAMAGED BY ANY DEMO WORK SHALL BE REPAIRED TO LIKE NEW CONDITION BY THE G.C.

WATER PROOFING NOTES

1. USE SIKA Sikalastic®-710 NP Base, AS BASE COAT OR EQUAL PER SPECIFICATIONS
2. USE SIKA Sikalastic®-715 LoVOC Textured FOR TOP COAT OR EQUAL PER SPECIFICATIONS
3. USE ALL MATERIALS WITH STRICT COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND REQUIREMENTS

TYPICAL SPALLED CONCRETE REPAIR

SC-1 THE CONTRACTOR SHALL LOCATE ALL SPALLS AS PER PLANS & LOCATE ANY OTHER SPALLS ADJACENT TO THE ONES SHOWN ON PLAN BY SOUNDING THE CONCRETE SURFACES USING A HAMMER. SUSPECTED AREAS OF DELAMINATION SHALL BE MARKED WITH CHALK OR PAINT.

SC-2 DELAMINATED, SPALLED, & UNSOUND CONCRETE AREAS SHALL HAVE THEIR MARKED BOUNDARIES SAW-CUT TO A MINIMUM DEPTH OF 2 1/2" INTO THE CONCRETE SURFACE. ALL EDGES SHALL BE STRAIGHT & PATCHED AREAS ARE TO BE AS SQUARE & RECTANGULAR AS POSSIBLE.

SC-3 CONCRETE SHALL BE REMOVED USING A 15# CHIPPING HAMMER.

SC-4 WHERE REINFORCEMENT IS EXPOSED BY CONCRETE REMOVAL, EXTRA CAUTION SHALL BE EXERCISED TO AVOID DAMAGING DURING REMOVAL OF ADDITIONAL UNSOUND CONCRETE.

SC-5 IF SCALE IS PRESENT ON REINFORCEMENT, ADDITIONAL CONCRETE SHALL BE REMOVED UNTIL CLEAN, SOUND REINFORCEMENT IS FOUND.

SC-6 UPON REMOVAL OF ALL DAMAGED CONCRETE , & PRIOR TO STARTING REPAIR, A REVIEW BY THE ENGINEER OF RECORD SHALL BE CONDUCTED.

SC-7 ALL EXPOSED CONCRETE & STEEL SHALL BE WIRE BRUSHED & CLEANED & TREATED WITH SIKA "ARMATEC" 110 EPOCEM.

SC-8 THE CUT AREA OF THE CONCRETE SHALL BE CLEAN & DRY PRIOR TO COMMENCEMENT OF PATCHING

SC-9 REPAIRS FOR SPALLS :

A. THE EXISTING CONCRETE SURFACE IS TO BE PREPARED IN A SATURATED, SURFACE DRY CONDITION JUST PRIOR TO PLACEMENT OF THE REPAIR MORTAR.

B. THE MIXED "SIKATOP 123" PLUS MORTAR OR SIKA 1000 MUST BE WORKED WELL WITH THE CONCRETE SURFACE FILLING ALL PORES & VOIDS. FORCE MATERIAL AGAINST CONCRETE SURFACE FILLING ALL PORES & VOIDS. FORCE MATERIAL AGAINST EDGE OF REPAIR, WORKING TOWARD CENTER. THOROUGHLY COMPACT THE MORTAR AROUND EXPOSED REINFORCEMENT. WHEN MULTIPLE LIFTS ARE REQUIRED (APPLICATION THICKNESS MAXIMUM 5" PER LIFT) SCORE TOP SURFACE ON EACH LIFT TO PRODUCE A ROUGHENED SUBSTRATE FOR NEXT LIFT. ALLOW PRECEDING LIFT TO HARDEN BEFORE APPLYING FRESH MATERIAL. SATURATE SURFACE OF THE LIFT WITH CLEAN WATER. IF PREVIOUS LAYERS ARE OVER 48 HOURS OLD. MECHANICALLY PREPARE THE SUBSTRATE. DAMPEN & APPLY BONDING AGENT OR SCRUB COAT PRIOR TO THE NEXT APPLICATION OF MORTAR.

DIMENSIONS

CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION AND/OR ORDERING MATERIAL. IN CASE OF ANY DISCREPANCY NOTIFY THE ENGINEER OF RECORD.

SCOPE OF WORK

1. SECURE THE AREA AS PER THE INSTRUCTIONS OF REGULATORY AGENCIES.
2. PERFORM DEMOLITION ON PORTION OF THE COMPONENTS TO REPAIR OR REBUILD AS PER ENGINEER ON RECORD'S INSTRUCTIONS.
3. PERFORM REPAIRS AS PER THE SPECIFICATIONS AND PERMITTED DOCUMENTS
4. FINISH TO MATCH EXISTING FINISH ON THE REPAIRED AREAS.
5. PAINT THE REPAIRED AREAS, PAINT COLOR TO MATCH EXISTING.
6. CLEAN THE AREA AND HALLWAY DEBRIS.
7. QUALITY OF FINISHES SHALL MATCH EXISTING AND SHALL SATISFY THE REQUIREMENTS OF THE CITY AT LAKE PARK AND THE ENGINEER OF RECORD
8. SHAPE OF REPAIRED BEAMS AND EDGE OF FLOOR SLAB SHALL MATCH EXISTING GEOMETRIC SHAPE, SIZE AND FINISH.

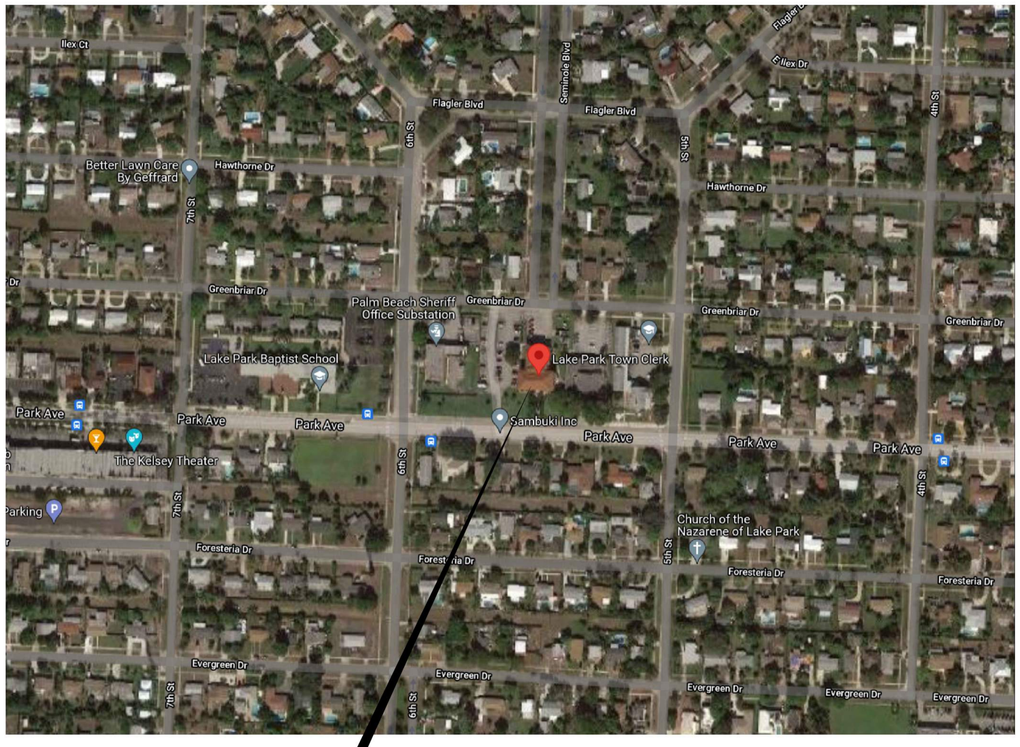
STRUCTURAL DESIGN CRITERIA & CODES

THE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE

FLORIDA BUILDING CODE (FBC) 2020, 7TH EDITION
OCCUPANCY MULTI-FAMILY RESIDENTIAL GROUP R-2
BUILDING CONSTRUCTION TYPE III-A
LEVEL I ALTERATION PER FBC
3 STORY BUILDING AND 1 STORY GARAGE BUILDING

DRAWING INDEX

LOCATION MAP NOT TO SCALE



AREA OF WORK

N

SHORING AND GENERAL NOTES

1. PROVIDE ADEQUATE SHORING TO SUPPORT THE EXISTING BUILDING STRUCTURE AND SECURE THE REPAIR AREA PRIOR TO ANY CUTTING OF CHISELING. ANY DAMAGE CAUSE BY THE CONCRETE REPAIR OPERATION SHALL BE REPAIRED BY THE CONTRACTOR IMMEDIATELY. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL SAFETY MEASURES TO PROTECT THE BUILDING, RESIDENTS, VISITOR, PEDESTRIAN, VEHICLES, NEIGHBORING BUILDINGS FROM ALL HARM DUE THE CONSTRUCTION OPERATION.
2. SAW CUT ALL EDGES.
3. DO NOT CUT EXISTING REBARS UNLESS DIRECTED BY THE ENGINEER OF RECORD.
4. ADD REBARS AS DIRECTED BY THE ENGINEER OF RECORD.
5. COAT ALL REBARS WITH WITH PRIMER (SIKA ARMETEC OR APPROVED EQUAL).
6. INSTALL CONCRETE FORMS AS REQUIRED.
7. POUR CONCRETE PER MANUFACTURER'S SPECIFICATIONS, WET ALL EXISTING CONCRETE EDGES AND SURFACES PRIOR TO NEW POUR.
8. CURE CONCRETE PER SPECIFICATIONS.
9. RESTORE ALL REPAIR AREA FINISH SURFACES TO MATCH EXISTING.
10. ALL COSTS OF THE ABOVE SHALL BE INCLUDED AS A LUMP SUM BASED ON CONTRACTOR'S FIELD MEASUREMENTS.
11. PAINT (PRIME AND PAINT) ALL REPAIRED AREAS TO MATCH EXISTING.
12. ALL BIDDERS SHALL VISIT THE SITE AND CALCULATE QUANTITIES OF REQUIRED REPAIRS TO BE A BASE FOR THE LUMP SUM BID AMOUNT.

Zuhair Jalloul

Digitally signed by Zuhair Jalloul
Date: 2021.11.30 14:33:27 -05'00'

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DATE Nov. 18, 2021
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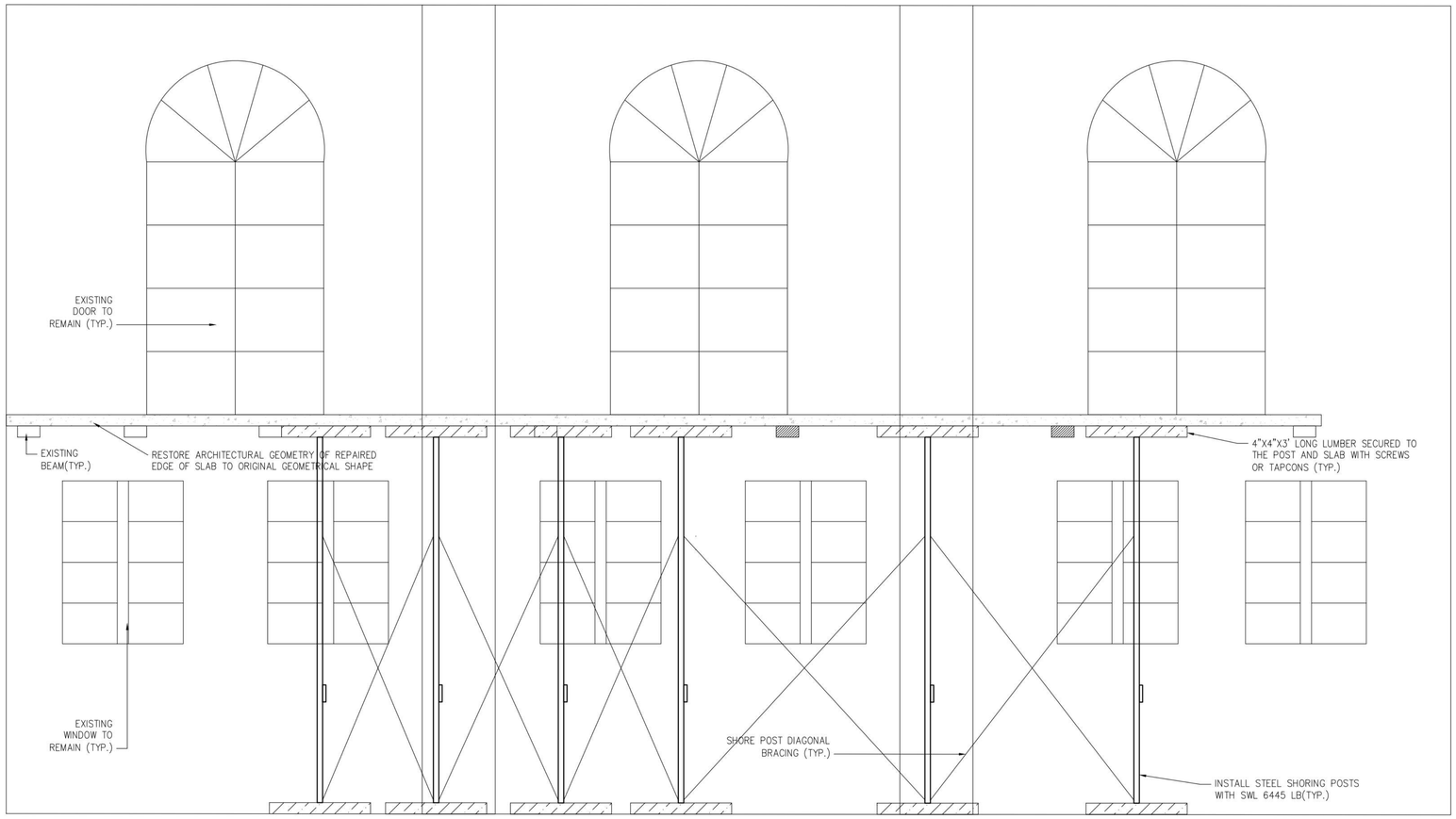
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall Balcony Concrete Repair

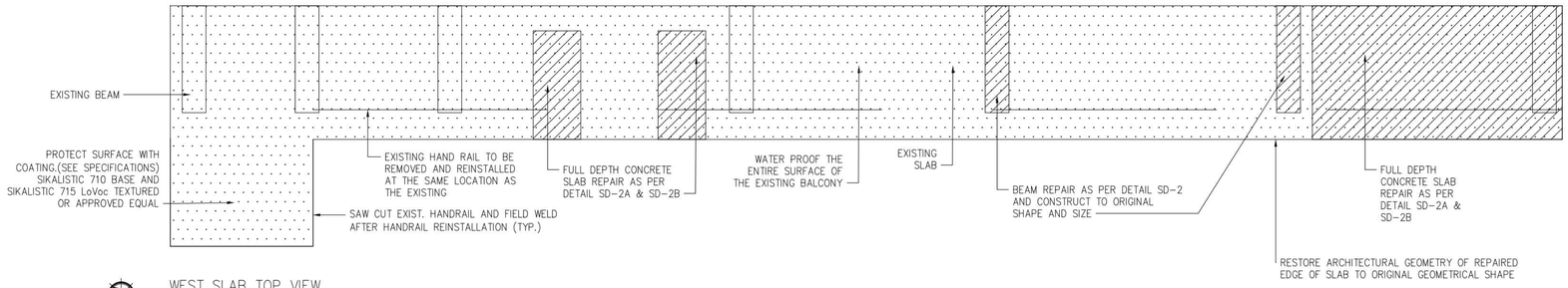
535 Park Ave,
Lake Park, FL 33403

GENERAL NOTES & LOCATION MAP

SHEET NUMBER
S-1
OF 6



WEST ELEVATION VIEW
SCALE: $\frac{1}{2}$" = 1'-0"



WEST SLAB TOP VIEW
SCALE: $\frac{1}{2}$" = 1'-0"

LEGEND:

- DAMAGED CONCRETE TO BE REPAIRED
- WATER PROOF AREA LIMIT
- EXISTING RAILING

QUANTITIES AND REPAIR SCHEDULE		
REPAIR TYPE	UNITS	ESTIMATED QUANTITY
CONC. SLAB & BEAM REPAIR	C.F.	45
WATER PROOFING	S.F.	320

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Lake Park Town Hall Balcony Concrete Repair

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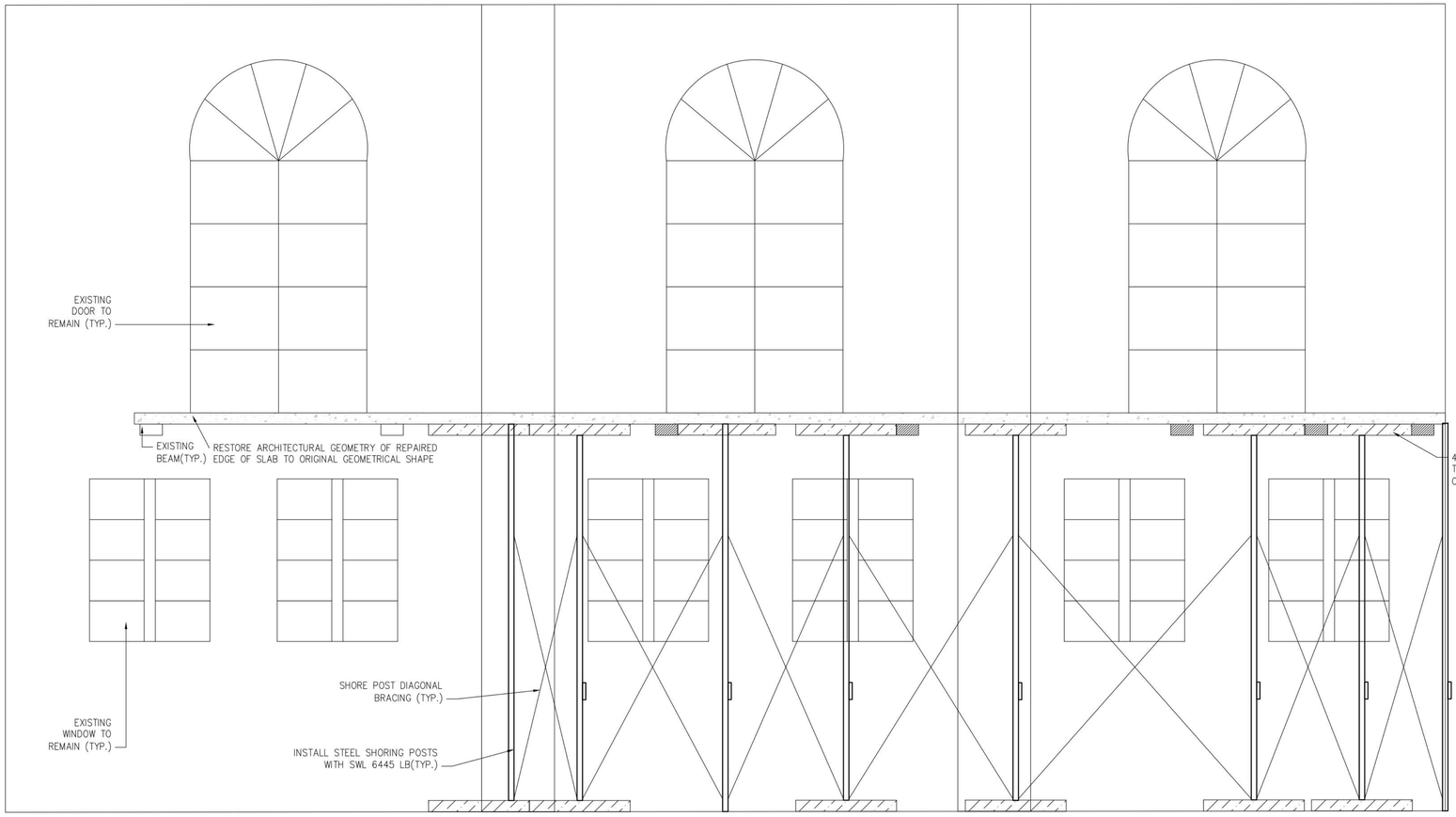
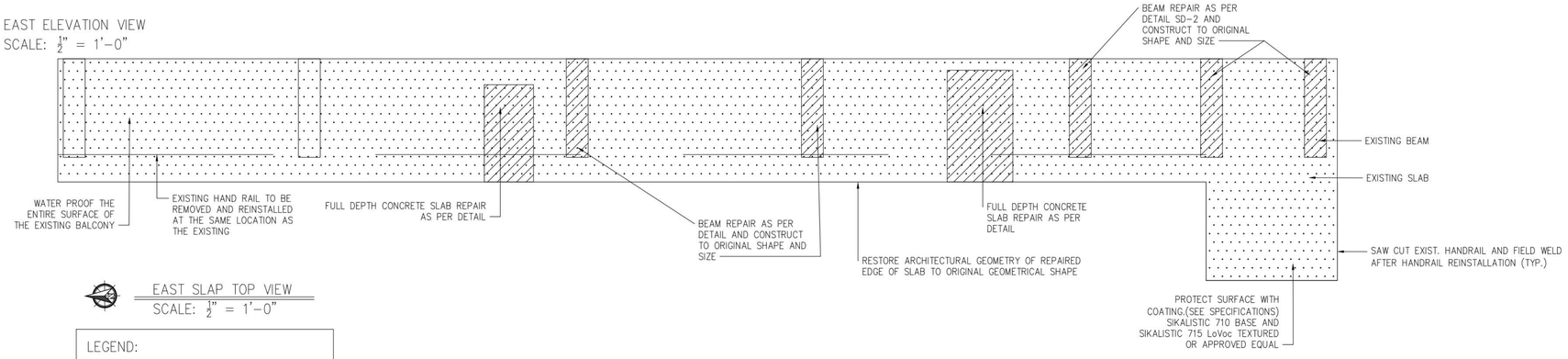
WEST SIDE CONCRETE RESTORATION

SHEET NUMBER
S-2
OF 6



EAST ELEVATION VIEW
SCALE: $\frac{1}{2}$" = 1'-0"



EAST SLAP TOP VIEW
SCALE: $\frac{1}{2}$" = 1'-0"

LEGEND:

- DAMAGED CONCRETE TO BE REPAIRED
- WATER PROOF AREA LIMIT
- EXISTING RAILING

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Lake Park Town Hall
Balcony Concrete Repair

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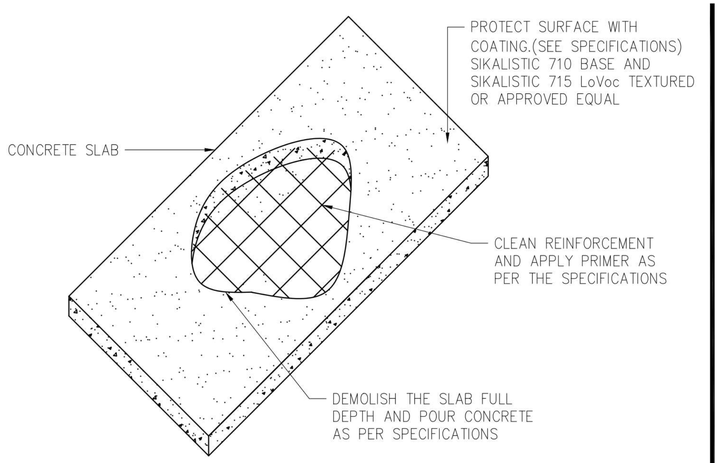
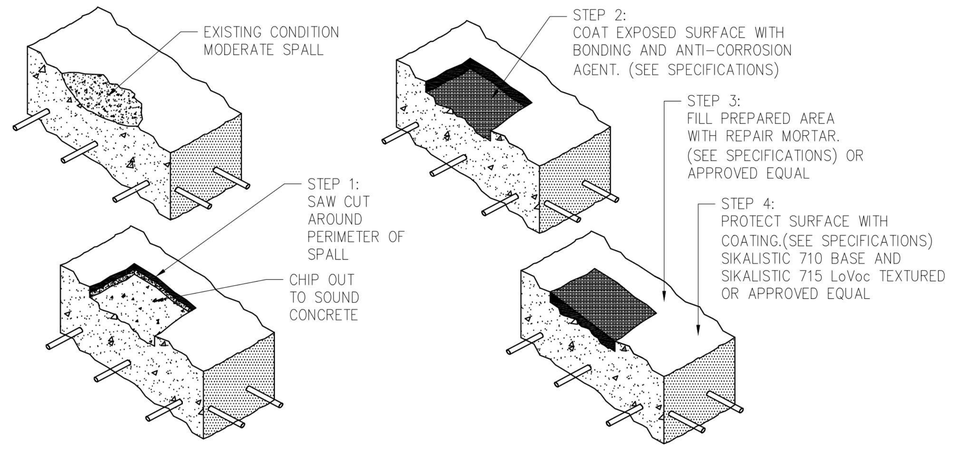
EAST SIDE CONCRETE RESTORATION

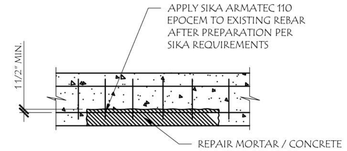
SHEET NUMBER
S-3
OF 6



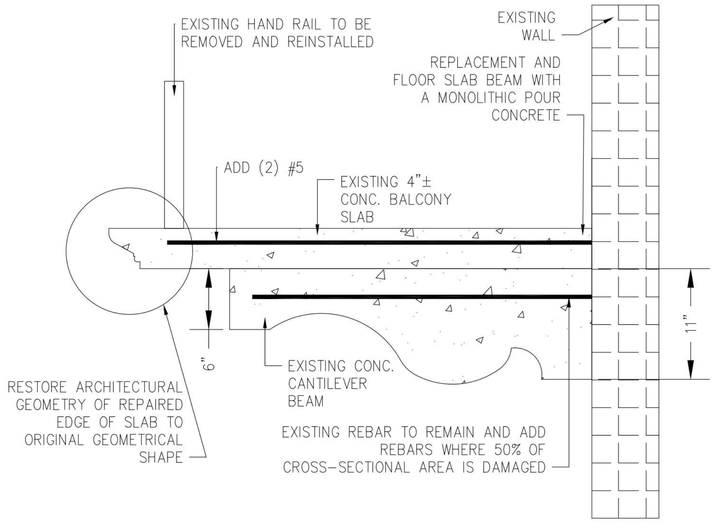
FULL DEPTH SLAB REPAIR



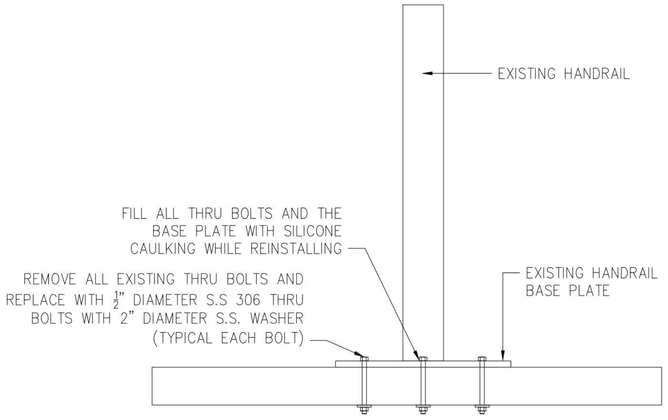
TYPICAL COLUMN & BEAM REPAIR



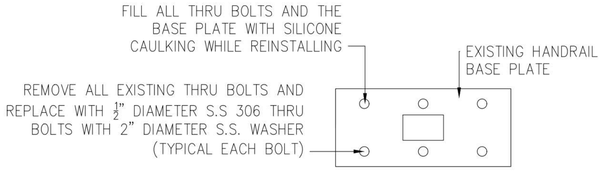
(SD-2B)TYPICAL BEAM REPAIR DETAIL



EXISTING ORIGINAL SLAB BEAM SHAPE (SIDE VIEW)



HANDRAIL BASE PLATE (SIDE VIEW)



HANDRAIL BASE PLATE (TOP VIEW)

CONCRETE REBAR PRIMER

BUILDING TRUST

PRODUCT DATA SHEET

Sika® Armatec®-110 EpoCem

BONDING PRIMER AND REINFORCEMENT CORROSION PROTECTION

PRODUCT DESCRIPTION

Sika® Armatec®-110 EpoCem is a cementitious epoxy resin compensated 3-component, solvent-free, coating material with corrosion inhibitor, used as bonding primer and reinforcement corrosion protection.

USES

- Suitable in concrete repair as corrosion protection for reinforcement
- Suitable as a bonding primer on mortar, steel, and on placing fresh, plastic concrete to existing hardened concrete
- Protection to reinforcing steel in areas of thin concrete cover

CHARACTERISTICS / ADVANTAGES

- Contains EpoCem® technology - improved bonding agent
- Extended open times for repair mortars
- Excellent adhesion to concrete and steel
- Contains corrosion inhibitor
- Good resistance to water and chloride penetration
- High shear strength
- Long pot life
- Can be brushed on or applied using spray gun
- Can be used exterior on-grade
- Excellent bonding bridge for cement or epoxy based repair mortars
- High strength, unaffected by moisture when cured
- Non-flammable, solvent free

PRODUCT INFORMATION

Chemical Base	Portland cement, epoxy resin, selected aggregates and additives.				
Packaging	**Unit**	**A**	**B**	**C**	**ABC**
	3.5 gal (13.2 L)	47.6 oz (1.4 L)	122.1 oz (3.6 L)	46.82 lb (21.3 kg)	A + B in carton, C in bag
	1.65 gal (6.2 L)	22.7 oz (0.67 L)	57.6 oz (1.7 L)	5.5 lb (2.5 kg) (4 bags)	Factory-proportioned units in a pail
Appearance / Color	Component A: White liquid Component B: Colorless liquid Component C: Gray powder				
Shelf Life	12 months from date of production if stored properly in original, unopened and undamaged sealed packaging				
Storage Conditions	Store dry at 40–95 °F (4–35 °C)				

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PROJECT NO.	211104
DRAWING FILE	----

Lake Park Town Hall
Balcony Concrete Repair

535 Park Ave,
Lake Park, FL 33403

CONCRETE REPAIRS DETAILS AND PRODUCT SPECIFICATIONS

SHEET NUMBER
S-4
OF 6

Protect Component A and B from freezing. If frozen, discard.
Protect Component C from moisture. If damp, discard.

TECHNICAL INFORMATION

Compressive Strength	3 days	4,500 psi (31.0 MPa)	(ASTM C-109) 73 °F (23 °C) 50 % R.H.
	7 days	6,500 psi (44.8 MPa)	
	28 days	8,500 psi (58.6 MPa)	
Flexural Strength	28 days	1,250 psi (8.6 MPa)	(ASTM C-348) 73 °F (23 °C) 50 % R.H.
Splitting Tensile Strength	28 days	600 psi (4.1 MPa)	(ASTM C-496) 73 °F (23 °C) 50 % R.H.
Tensile Adhesion Strength	**Bond of steel reinforcement on concrete**		
	Sika® Armatec® 110	625 psi (4.3 MPa)	(ASTM C-1583) 73 °F (23 °C) 50 % R.H.
	EpoCem coated		
	Epoxy coated	508 psi (3.5 MPa)	
	Plain reinforcement	573 psi (4.0 MPa)	
Slant Shear Strength	**Bonding agent properties** (14 d. moist cure, plastic to hardened concrete)		
	Wet on wet	2,800 psi (19.3 MPa)	(ASTM C-882) 73 °F (23 °C) 50 % R.H.
	24 hr. open time	2,600 psi (17.9 MPa)	
Permeability to Water Vapor	Control	7.32 x 10^{-10} ft/sec	
	145 psi (10 bar)	8.92 x 10^{-15} ft/sec	
Diffusion Resistance to Water Vapor	μ H_2O ~100		
Permeability to CO2	μ CO_2 ~14,000		
Corrosion Test	**Time-to-Corrosion Study**		
	• Sika® Armatec®-110 EpoCem more than tripled the time to corrosion		
	• Reduced corrosion rate by over 40 %		

APPLICATION INFORMATION

Fresh Mortar Density	A+B+C ~125 lb/ft³ (~2.00 kg/l)		
Coverage	**Bonding agent**	80 ft²/gal (7.4 m²/l)	
	Corrosion Protection	40 ft²/gal (3.7 m²/l)	
	(Coverage figures do not include allowance for surface profile and porosity or material waste)		
Layer Thickness		**Min. thickness of 1 coat**	**Coat**
	Bonding agent	20 mils	1
	Corrosion Protection	20 mils	2
Product Temperature	65°-75°F (18°-24°C)		
Ambient Air Temperature	40–95 °F (5–35 °C)		
Substrate Temperature	40–95 °F (5–35 °C)		
Pot Life	~ 90 minutes		
Waiting / Recoat Times	Sika repair mortars and non-fast setting concrete can be applied on Sika® Armatec®-110 EpoCem within a maximum time of:		

Compressive Strength	3 hours	1,250 psi (8.6 MPa)	(ASTM C 109) 73° F (23° C), 50% R.H.
	1 day	4,000 psi (27.5 MPa)	
	7 days	5,000 psi (34.5 MPa)	
	28 days	7,000 psi (48.3 MPa)	
Modulus of Elasticity in Compression	28 days	4.6 x 10^6 psi (32 GPa)	(ASTM C-469) 73° F (23° C), 50% R.H.
Flexural Strength	1 day	700 psi (4.8 MPa)	(ASTM C 293) 73° F (23° C), 50% R.H.
	7 days	900 psi (6.2 MPa)	
	28 days	1,000 psi (6.9 MPa)	
Splitting Tensile Strength	1 day	200 psi (1.4 MPa)	(ASTM C 496) 73° F (23° C), 50% R.H.
	7 days	300 psi (2.1 MPa)	
	28 days	400 psi (2.8 MPa)	
Tensile Adhesion Strength	28 days	Approximately 300 psi (2.1 MPa) Substrate failure	(ACI 503R) 73° F (23° C), 50% R.H.
Shrinkage	28 days	0.06%	(ASTM C 157 modified per ASTM C-928) 73° F (23° C), 50% R.H.
Abrasion Resistance	28 days	0.026 inch (0.66 mm) of wear at 1 hour	(ASTM C 779) 73° F (23° C), 50% R.H.
Freeze-Thaw Stability	28 days	98%	(ASTM C 666)
Freeze Thaw De-icing Salt Resistance	50 cycles	0.080 lb / ft² (391 grams / m²)	(ASTM C 672)
Rapid Chloride Permeability	28 days	< 1,000 Coulombs	(ASTM C 1202 / AASHTO T 277) 73° F (23° C), 50% R.H.

APPLICATION INFORMATION

Mixing Ratio	4.5 – 5 pints (2.1 – 2.4 L)		
Coverage	Neat	0.43 ft² (0.012 m²)	
	Extended with 25 lbs (11.4 kg) of 3/8 inch (10 mm) pea gravel	0.58 ft²(0.017 m²)	
	(Yield figures do not include allowance for surface profile, porosity or material waste)		
Consumption / Yield / Dosage (PRINT single line)			
Layer Thickness		**Min.**	**Max.**
	Neat	1/4 inch (6 mm)	2 inches (50 mm)
	Extended	1 inch (25 mm)	6 inches (152 mm)

- Do not feather edge
- Do not exceed 7 inches (178 mm) slump when extended

Temperature	Maximum Waiting Time
80°- 95 °F (26°- 35 °C)	6 hours
65°-79 °F (18°- 26 °C)	12 hours
50°- 64° F (10°- 17° C)	16 hours
40°- 49° F (4°- 9° C)	wet-on-wet

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Concrete
- Free from dust, loose material, surface contamination and materials which reduce bond or prevent suction or wetting by repair materials.
- Delaminated, weak, damaged and deteriorated concrete and where necessary sound concrete shall be removed by suitable means.
- Substrate must be Saturated Surface Dry (SSD) with no standing water.

Steel reinforcement
- Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed by blast cleaning or other means of mechanical abrasion and reinforcement.
- Should be fully exposed and have all corrosion removed.

MIXING

- Sika® Armatec®-110 EpoCem can be mixed with a low-speed (< 250 rpm) electric drill mixer.
- Shake components A and B thoroughly before opening.
- Pour liquid components A and B into a suitable mixing vessel and mix for 30 seconds.
- While still mixing components A and B slowly add powder component C.
- Mix the three components together for a minimum 3 minutes until blend is uniform and free of lumps, minimizing addition of air.
- Mix only the quantity that you can be applied within the pot life.
- DO NOT ADD WATER.

APPLICATION

As reinforcement corrosion protection
- Apply by stiff-bristle brush or spray at 80 ft² /gal.
- Take special care to properly coat the underside of the totally exposed steel.
- Allow coating to dry 2-3 hours at 73 °F, then apply a second coat at the same coverage.
- Allow to dry again before the repair mortar or concrete is applied.
- Pour or place repair within 7 days

As a bonding primer
- Apply using a stiff-bristle brush or broom. To achieve good bond, Sika® Armatec®-110 EpoCem must be applied well into the substrate, filling all pores and ensure complete coverage of all surface irregularities (minimum layer thickness 1/64" (0.5 mm).
- Spray apply with Goldblatt Pattern Pistol or equal equipment.
- Apply the freshly mixed patching mortar or concrete wet on wet, or up to the maximum recommended open time, onto the bonding slurry.

CURING TREATMENT

Sika® Armatec®-110 EpoCem must be protected against contamination and rain until application of the repair mortar.

CLEANING OF TOOLS

Clean all tools and application equipment with water immediately after use. Hardened material can only be mechanically removed.

LIMITATIONS

- Avoid application in direct sun and/or strong wind and/or rain.
- Do not add water.
- Not a vapor barrier.
- Apply only to sound, prepared substrates.
- Not recommended for use with expansive grouts and SikaQuicks
- Use of semi-dry mortars onto Sika® Armatec®-110 EpoCem must be applied "wet on wet"
- When used in overhead applications with hand placed patching mortars, use "wet on wet" for maximum mortar built thickness.
- Substrate profile as specified by the overlay or repair material is still required.
- As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur® Hi-Mod 32.

Product Temperature	65° – 75° F (18° – 24° C)
Ambient Air Temperature	> 40° - 95° F (4° - 35° C)
Substrate Temperature	> 40° - 95° F (4° - 35° C)
Set Time	35 – 85 minutes (ASTM C 266) 73° F (23° C), 50% R.H.
Final Set Time	> 120 minutes (ASTM C 266) 73° F (23° C), 50% R.H.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

- Concrete surface must be clean and sound.
- Remove all deteriorated concrete, dirt, oil, grease, and other bond-inhibiting materials from the area to be repaired.
- Be sure repair area is not less than 1/4" (6 mm) deep.
- Preparation work should be done by high pressure water blast, scabbler or other appropriate mechanical means to obtain an exposed aggregate surface profile of ± 1/8" (3 mm) [minimum CSP-6].
- To ensure optimum repair results, the effectiveness of decontamination and preparation should be assessed by a Tensile Adhesion Strength (pull-off) test.
- Saw cutting perimeter edges of concrete repair area at a dovetail is preferred.
- Substrate should be Saturated Surface Dry (SSD) with clean water prior to application. No standing water should remain during application.
- Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed from steel reinforcement.
- Surfaces shall be prepared using abrasive blast cleaning techniques or high pressure water blasting to acheive a bright metal finish.

PRIMING

- Concrete substrate: Prime the prepared substrate with a scrub coat of SikaQuick®-1000 / SikaQuick®-1000 LD prior to placement of the mortar. The repair mortar has to be applied into the wet scrub coat before it dries.
- Reinforcing Steel: Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high pressure washed with clean water after mechanical cleaning. For priming of reinforcing steel use Sika® Armatec® corrosion protection products (consult current Product Data Sheets).

MIXING

- Wet down all tools and mixer to be used.
- Pour the required amount of clean, potable water [approximately 70° F (21° C)] into a suitably sized and clean mixing container, using a calibrated measuring jug or similar, to ensure strict controlof the water content. Do not over-water.
- Add 1 bag while continuing to mix with a low-speed drill (400 - 600 rpm) and mortar mixing paddle, or in an appropriate morter mixer.
- Once all the powder has been added, mix to a uniform consistency, maximum 3 minutes, until a lump-free blend is achieved.
- Thorough mixing and proper proportioning of the powder and liquide is necessary.
- To help control setting times, colder water may be used in hot weather and warmer water may be used in cold weather.
- Inaccurate proportioning of the powder to liquid will result in a finished product that may not conform to the typical published performance property values.

- **With water or undiluted SikaLatex® R**: Pour 4.5 pints (2.1 L) of liquid into the mixing container. Slowly add powder, mix and adjust as above. Add up to another 1/2 pint (0.24 L) maximum of liquid to achieve desired consistency. Do not over-water.

- **With diluted SikaLatex® R**: SikaLatex® R admixture may be diluted up to 5:1 (water: SikaLatex® R) for projects requiring minimal polymer modification. Pour 4.5 pints (2.1 L) of the mixture into the mixing container. Slowly add powder, mix and adjust as above.

EXTENSION WITH AGGREGATES

- For applications greater than 1" (25 mm) in depth, add 3/8" (10 mm) coarse aggregate.
- The typical addition rate is 25 lbs (11.4 kg) of aggregate per bag. It is approximately 2 gallons (7.6 L) by loose volume of aggregate.
- The aggregate must be non-reactive (reference ASTM C 1260, C 227 and C 289), clean, well graded, Saturated Surface Dry (SSD), have low absorption and high density, and comply with ASTM C 33 size number 8 per Table 2.
- Variances in aggregate may result in different

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

DIRECTIVE 2004/42/CE - LIMITATION OF EMISSIONS OF VOC

A+B+C combined	50 g/l

LEGAL DISCLAIMER

- **KEEP CONTAINER TIGHTLY CLOSED**
- **KEEP OUT OF REACH OF CHILDREN**
- **NOT FOR INTERNAL CONSUMPTION**
- **FOR INDUSTRIAL USE ONLY**
- **FOR PROFESSIONAL USE ONLY**

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

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strengths.
- Do not use limestone aggregate.
- Do not exceed a slump of 7" (178 mm). This may cause excessive bleeding and retardation and may reduce the strength and performance of the material.

APPLICATION

- A neat mix of SikaQuick®-1000 / SikaQuick®-1000 LD mortar must be scrubbed into the mechanically prepared, SSD substrate. Be sure to fill all pores and voids.
- Force material against edge of repair, working toward center. After filling repair, screed off excess.
- Allow material to set to desired stiffness, then finish with wood or sponge float for a smooth finish, or broom or burlap-drag for a rough finish.
- If a smoother finish is desired, a magnesium float should be used.
- To assist in the finishing process, use SikaFilm® finishing aid. Consult current Product Data Sheet.
- Mixing, placing, and finishing should not exceed 30 minutes maximum.
- Refer to ACI 305, the "Guide to Hot Weather Concreting" or ACI 306, the "Guide to Cold Weather Concreting" when there is a need to place this product while either hot or cold temperatures prevail. Thinner placements will be more sensitive to the temperature conditions.

CURING TREATMENT

- As per ACI recommendations for portland cement concrete, moist curing is required.
- Moist cure with wet burlap and polyethylene, a fine mist of water or with a water based,* compatible curing compound meeting ASTM C 309.
- Curing compounds adversely affect the adhesion of following lifts of mortar, leveling mortar or protective coatings.
- Moist curing should commence immediately after finishing.
- Protect freshly applied mortar from direct sunlight, wind, rain and frost.
- To prevent from freezing, cover with insulating material (e.g. curing blanket).

* Pretesting of curing compound is recommended.

LIMITATIONS

- Avoid application in direct sunlight, during precipitation and/or when strong winds prevail.
- Use only clean, potable water
- As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur®-32 Hi-Mod.
- Bonding agents (e.g. Sika® Armatec® 110 EpoCem) should not be used. Use of the neat mortar as a scrub coat is recommended and preferred. If bonding agents are used, follow cure times for the bonding agents used as a guide prior to putting SikaQuick®-1000 / SikaQuick®-1000 LD in service. Assure suitability with the manufacturer of the bonding agent.
- SikaQuick®-1000 / SikaQuick®-1000 LD does not form a vapor barrier when cured.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

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SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR**

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BUILDING TRUST

PRODUCT DATA SHEET
SikaQuick®-1000

Rapid hardening repair mortar with extended working time

PRODUCT DESCRIPTION

SikaQuick®-1000 is a one-component, rapid hardening, early strength gain, cementitious, patching mortar for concrete. SikaQuick®-1000 LD is a low dust version of this formula.

USES

- On grade, above grade and below grade concrete conditions
- Highway overlays and repairs
- Structural repair material for concrete roadways, parking structures, bridges, dams and ramps
- Full depth patching repairs (may require multiple lifts)
- Economical patching material for horizontal flatwork repairs of mortar lines and concrete surfaces

CHARACTERISTICS / ADVANTAGES

- Specially suited for warmer weather applications when extended working time is required
- Epoxy coatings can be applied as early as 6 hours at 73° F (23° C).
- Freeze / thaw resistant
- Easy to use - labor-saving material
- Not gypsum-based
- High early strength
- Open to foot traffic in 4 hours / Open to vehicular traffic in 6 hours at 73° F (23° C)
- Easily applied to clean, sound substrates
- SikaQuick®-1000 LD is an available, low dust version of this product.

APPROVALS / STANDARDS

- Rapid hardening as defined by ASTM C 928

PRODUCT INFORMATION

Chemical Base	• SikaQuick®-1000 is a blend of cement, select aggregates and specialty additives • SikaQuick®-1000 LD is a blend of cement, select aggregates, low dust and specialty additives
Packaging	50 lb (22.7 kg) bag
Appearance / Color	Gray powder
Shelf Life	12 months from date of manufacture if stored properly in original, unopened and undamaged, sealed packaging
Storage Conditions	Store dry at 40° – 95° F (4° – 35° C) Protect from moisture. If damp, discard material

TECHNICAL INFORMATION

PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.

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DATE	REVISIONS

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FL OR I.D.
PROFESSIONAL ENGINEER

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DATE Nov. 18, 2021
SCALE AS SHOWN
DWNG. BY P.E.S.
CHECKED BY Z. JALLOUL
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall Balcony Concrete Repair

535 Park Ave,
Lake Park, FL 33403

CONCRETE REPAIRS PRODUCT SPECIFICATIONS

SHEET NUMBER
S-5
OF 6

BUILDING TRUST

PRODUCT DATA SHEET

Sikalastic®-710 NP Base

Single component, elastomeric, crack-bridging, primerless, waterproofing base coat

PRODUCT DESCRIPTION

Sikalastic®-710 NP Base is a single component, aromatic, moisture cured, elastomeric polyurethane coating intended for use as the waterproofing base coat under polyurethane or epoxy wearing surfaces for pedestrian and vehicular traffic bearing applications, and as the waterproofing base coat under a separate wearing course such as concrete, and tile in a setting bed. Sikalastic®-710 NP Base can be a direct replacement for Sikalastic® 710 in all applications.

CHARACTERISTICS / ADVANTAGES

- Excellent crack-bridging properties and flexibility, even at low temperatures
- Primer not required for typical applications
- Resistant to water and deicing salts
- Alkaline resistant

USES

- Multi-story parking garages
- Parking decks and ramps
- Foot bridges and walkways
- Mechanical rooms
- Stadiums and arenas
- Plaza and rooftop decks
- Balconies
- Sikalastic®-710 NP Base can be used in the following systems:
  - Sikalastic®-710 NP Base/ Sikalastic®-715 Top
  - Sikalastic®-710 NP Base/Sikalastic®-715 Textured
  - Sikalastic®-710 NP Base/Sikalastic®-736 Textured

PRODUCT INFORMATION

Packaging	5 gal. pails, 50 gal. (net) drums
Appearance / Color	Medium Gray
Shelf Life	1 year in original, unopened containers
Storage Conditions	Store dry at 40–95 °F (4–35 °C). Condition material to 65–85 °F (18–30 °C) before using.

Solid content by volume	71 %	(ASTM D-2697)
Volatile organic compound (VOC) content	240 g/L	(ASTM D-2369-81)
Viscosity	6500 ± 3000 cps	

TECHNICAL INFORMATION

Shore A Hardness	55 ± 5	(ASTM D-2240)
Tensile Strength	650 ± 100 psi	(ASTM D-412)
Elongation at Break	375 ± 50 %	(ASTM D-412)
Tear Strength	170 ± 25 pli	(Die C, ASTM D-624)
Chemical Resistance	Resistant to de-icing salts.	

APPLICATION INFORMATION

Coverage	50 ft²/gal. at 32 wet mils (23 dry mils). NOTE: Coverage rates provided are optimal and are not guaranteed. Coverage rates will vary depending on temperature, surface roughness and porosity, aggregate selection and embedment, and application technique.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Surface must be clean, dry and sound with an open texture. Remove dust, laitance, grease, curing compounds, bond inhibiting impregnations, waxes, and any other contaminants. All projections, rough spots, etc., should be dressed off to achieve a level surface prior to the application.
Concrete - Should be cleaned and prepared to achieve a laitance and contaminant free, open textured surface by blast cleaning or equivalent mechanical means. The use of a primerless-type base coat requires that the concrete surface be sufficiently prepared and open pored so that the base coat is able to penetrate the substrate surface and achieve an adequate bond. The desired surface texture (CSP 2-3 per ICRI Guidelines). In addition, the substrate surface must be thoroughly cleaned by blowing/vacuuming to remove all particulates that may interfere with base coat bonding. The base coat will not mix and consolidate dust and particulates as will some primers, so thorough cleaning is mandatory.
Plywood – Should be clean and smooth, APA and exterior grade, not less than ½" thick, and spaced and supported according to APA guidelines. Joints should be sealed with Sikaflex® 2c or 1a and detailed, and may need embedded fabric reinforcement.
Metal - Should be thoroughly cleaned by grinding or blast cleaning.

Detailing

Non-structural cracks up to 1/16 inch – Apply a detail coat of Sikalastic®-710 NP Base at 32 mils wet, 4" wide, centered over the crack. Allow to become tack free before overcoating.

Cracks and joints over 1/16 up to 1 inch – Seal previously routed and primed cracks and joints with Sika Sealant and allow to skin over and cure for 24 hours min. Apply a detail coat of Sikalastic®-710 NP Base at 32 mils wet, 4" wide, centered over the crack. Allow to become tack free before overcoating.

Joints over 1 inch – Should be treated as expansion joints and brought up through the Sikalastic® Traffic System and sealed with Sika sealant (see Sealant Guide).

Fabric Reinforcement – An optional 3" or 6" wide Sikalastic Flexitape Heavy fabric strip may be embedded within the base coat. Flexitape width shall be chosen such that a minimum of 1" tape is embedded on either side of the crack/joint. Apply additional coating as required to fully embed the Flexitape in the coating.

Panelized Joints – Panelized joints that are restrained across the joint and without differential movement may be sealed and the deck coating, including detail coat, applied over the joint.
NOTE: movement within panelized joints may cause deterioration of the aggregated wear coat, in which case the joints should be treated as expansion joints and brought up through the Sikalastic® Traffic System and sealed with Sika sealant .

Expansion Joints - Should be extended through System .

MIXING

Thoroughly mix coating using a mechanical mixer (Jiffy) at slow speed until a homogenous mixture and uniform color is obtained (typically 1 minute). Use care not to allow the entrapment of air into the mixture.

APPLICATION

Apply at the recommended coverage rate (see Sikalastic® 710/715/735 AL System Guide) using a notched squeegee or trowel, and backroll using a phenolic resin core roller. Extend base coat over entire area including previously detailed cracks and joints. Allow coating to cure a minimum of 16 hours at 70 °F and 50 % RH or until tack fee before top coating. Allow coating to cure for a minimum of 72 hours before installing separate concrete pavement or tile wear course.

Removal

Remove liquid coating immediately with dry cloth. Once cured, coating can only be removed by mechanical means.

LIMITATIONS

- To avoid dew point conditions during application relative humidity must be no more than 95 % and substrate temperature must be at least 5 °F (3 °C) above measured dew point temperature.
- Maximum moisture content of concrete substrate by weight when measured with a Tramex CME is 4% .
- Minimum ambient and substrate temperature during application and curing of material is 40 °F (4 °C); maximum is 95 °F (35 °C).
- Do not store materials outdoors directly exposed to sunlight and moisture. Cover and protect materials with breathable type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Observe temperature storage and conditioning requirements.
- Do not thin with solvents.
- Minimum age of concrete must be 21–28 days, depending on curing and drying conditions.
- Any repairs required to achieve a level surface must be performed prior to application (consult a Sika representative for guidance on various product solutions). Surface irregularities may reflect through the cured system.
- Do not apply to a porous or damp surface where moisture vapor transmission will occur during application and cure.
- Substrate must be dry prior to application. Do not apply to a frosted, wet or damp surface. Do not proceed if rain is imminent within 8–12 hours of application. Allow sufficient time for the substrate to dry after rain or inclement weather as there is the potential for bonding problems.
- When applying over existing coatings compatibility and adhesion testing is recommended.
- Precautions should be taken to prevent odors and/or vapors from entering the building/structure, including but not limited to turning off and sealing air intake vents or other means of ingress for odors and for vapors into the building/structure during product application and cure.
- On grade, lightweight concrete, asphalt pavement, or insulated split slab applications, or applications where chained or studded tires may be used, must not be coated with Sikalastic Traffic Systems without Sika technical review. Contact Sika Technical Services/Product Engineering
- Unvented metal pan decks or decks containing a between-slab membrane require further technical evaluation and priming with a moisture-tolerant primer - contact Sika regarding recommendations.
- Waterproofing applications under overburden, including concrete pavement, and tile in a cementitious setting bed, require further technical evaluation - contact Sika regarding recommendations.
- Do not subject to continuous immersion or ponding water.
- Sikalastic® 710 NP is not UV stable and must be top coated or protected by a separate wearing course.
- Primer coat must be kept clean and recoated within 48 hours. If this window is exceeded, contact Sika for recommendations.
- Mockups to verify application methods and substrate conditions as well as desired skid resistance and aesthetics are highly recommended.
- Cracks or ruptures which develop in the structure after the waterproofing traffic system has been installed will not be bridged by the waterproofing traffic system and need to be repaired according to the recommended standard crack treatment details per this PDS.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LEGAL DISCLAIMER

• KEEP CONTAINER TIGHTLY CLOSED
• KEEP OUT OF REACH OF CHILDREN
• NOT FOR INTERNAL CONSUMPTION
• FOR INDUSTRIAL USE ONLY
• FOR PROFESSIONAL USE ONLY

Prior to each use of any product of Sika Corporation, its subsidiaries or affiliates ("SIKA"), the user must always read and follow the warnings and instructions on the product's most current product label, Product Data Sheet and Safety Data Sheet which are available at usa.sika.com or by calling SIKA's Technical Service Department at 1-800-933-7452. Nothing contained in any SIKA literature or materials relieves the user of the obligation to read and follow the warnings and instructions for each SIKA product as set forth in the current product label, Product Data Sheet and Safety Data Sheet prior to use of the SIKA product.

SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. SIKA SHALL NOT BE LIABLE UNDER ANY LEGAL THEORY FOR SPECIAL OR CONSEQUENTIAL DAMAGES. SIKA SHALL NOT BE RESPONSIBLE FOR THE USE OF THIS PRODUCT IN A MANNER TO INFRINGE ON ANY PATENT OR ANY OTHER INTELLECTUAL PROPERTY RIGHTS HELD BY OTHERS.**

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BUILDING TRUST

PRODUCT DATA SHEET

Sikalastic®-715 LoVOC Textured

Single component, integrally textured, elastomeric, low-VOC, wear and top coat

PRODUCT DESCRIPTION

Sikalastic®-715 LoVOC Textured is a single component, UV-resistant, aromatic, moisture cured, low VOC elastomeric polyurethane coating intended for use as the wear and top coat over polyurethane waterproofing membrane for pedestrian and vehicular traffic bearing applications, and as a protective top coat over polyurethane waterproofing membrane under a separate wearing course such as concrete, and tile in a setting bed.

CHARACTERISTICS / ADVANTAGES

- Low VOC - California Compliant
- Fast turnaround with optional Booster
- Excellent crack-bridging properties and flexibility, even at low temperatures
- Outstanding resistance to abrasion and wear
- Resistant to water and deicing salts
- Alkaline resistant
- UV resistant
- Range of standard colors

USES

Sikalastic®-715 LoVOC Textured may only be used by experienced professionals.

- Multi-story parking garages
- Parking decks and ramps
- Foot bridges and walkways
- Mechanical rooms
- Stadiums and arenas
- Plaza and rooftop decks
- Balconies

PRODUCT INFORMATION

Packaging	4.75 gal. in 5 gal. pails
Appearance / Color	Gray, Charcoal and Tan
Shelf Life	12 months in original, unopened containers
Storage Conditions	Store dry at 40–95 °F (4–35 °C). Condition material to 65–85 °F (18–30 °C) before using.

Solid content by volume	**715 Lo-VOC T w/o Booster** 86.5 %	**715 Lo-VOC T w/ Booster** 86.5 %	(ASTM D-2697)
Volatile organic compound (VOC) content	**715 Lo-VOC T w/o Booster** 98.8 g/L	**715 Lo-VOC T w/ Booster** 93.8 g/L	(ASTM D-2369-81)
Viscosity	**715 Lo-VOC T w/o Booster** 7000 ± 2000 cps	**715 Lo-VOC T w/ Booster** 7000 ± 2000 cps	

TECHNICAL INFORMATION

Shore A Hardness	**715 Lo-VOC T w/o Booster** 85 ± 5	**715 Lo-VOC T w/ Booster** 80 ± 5	(ASTM D-2240) 75 °F (24 °C) 50 % R.H. non seeded film
Tensile Strength	**715 Lo-VOC T w/o Booster** 3400 ± 300 psi	**715 Lo-VOC T w/ Booster** 3400 ± 300 psi	(ASTM D-412) 75 °F (24 °C) 50 % R.H. non seeded film
Elongation at Break	**715 Lo-VOC T w/o Booster** 450 ± 50 %	**715 Lo-VOC T w/ Booster** 250 ± 50 %	(ASTM D-412) 75 °F (24 °C) 50 % R.H. non seeded film
Tear Strength	**715 Lo-VOC T w/o Booster** 300 ± 50 pli	**715 Lo-VOC T w/ Booster** 300 ± 50 pli	non seeded film
Chemical Resistance	Resistant to deicing salts, and alkaline concrete and cementitious mortars/tile adhesives		

APPLICATION INFORMATION

Coverage	70 sf/gal at 16 wet mils (14 dry mils) 60 sf/gal at 18 wet mils (16 dry mils) 53 sf/gal at 20 wet mils (18 dry mils) Coverage rates provided are intended to achieve required wet film thickness under optimal conditions. Additional material may be required depending on substrate surface roughness and porosity, material, substrate and air temperatures, and other site-dependent factors. This will result in a lower coverage rate.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Surface must be clean, dry and sound with an open texture. Remove dust, laitance, grease, curing compounds, bond inhibiting impregnations, waxes, and any other contaminants. All projections, rough spots, etc. should be dressed off to achieve a level surface prior to the application.

Sikalastic® 710 Base Lo-VOC Waterproofing Base Coat - Coating should be cured and tack free.

Existing Coatings - Should be cleaned and mechanically abraded to provide a contaminant free, open textured surface. Solvent wipe as allowed by state and local regulations. Use Sikalastic® Recoat Primer .

MIXING

Thoroughly mix Sikalastic®-715 LoVOC Textured for 3 minutes using a mechanical mixer (Jiffy) at slow speed until a homogenous mixture and uniform color is obtained . Make sure to scrape the solids and the aggregate from the bottom and sides of the pail. The aggregate should be evenly diffused in the resin. Use care not to allow the entrapment of air into the mixture.

APPLICATION

Wear coat: Apply at the recommended coverage rate 18 mils wet (60 sf/gal) using a 1/8" or 3/16" notched squeegee or trowel, and backroll using nap roller 3/8" to uniformly backroll prior to applying topcoat. It should be backrolled two times, one perpendicular to the other.

Top coat: Apply at the recommended coverage rate 18 mils wet (60 sf/gal) using a 1/8" or 3/16" notched squeegee or trowel, and backroll using nap roller 3/8" to uniformly backroll. The Top coat should be backrolled two times, one perpendicular to the other. Allow coating to cure a minimum of 4 hours at 70 °F and 50 % R.H.; coating must be tack free before overcoating. Allow coating to cure for a minimum of 36 hours before opening to vehicular traffic

Booster - Sikalastic® 715 Top Lo-VOC Booster may be added to Sikalastic®-715 LoVOC Textured in order to speed cure time. Mix thoroughly prior to application. Add a maximum of 1 quart to 4.75 gallons (or 1:19 ratio) and only to material that will be applied within 1 hour. Allow coating with booster to cure a minimum of 6 hours at 70 °F and 50 % R.H. or until tack fee between coats. Allow coating to cure for a minimum of 36 hours before opening to vehicular traffic or installing separate wear course.

Removal

Remove liquid coating immediately with dry cloth. Once cured, coating can only be removed by mechanical means.

MAINTENANCE

Clean with non-sudsing detergent and water and inspect regularly for mechanical damage. Snow removal equipment must have shoes, rubber tips or small skis to prevent ruptures. The use of metal blades without protection is not recommended. Damaged areas should be repaired promptly. Remove delaminated coating back to well adhered material and reinstall patch according to procedures described above. Do not use asphalt or tar modified products. Consult a Sika representative for recommendations on top coat or wearing surface restoration.

LIMITATIONS

- To avoid dew point conditions during application relative humidity must be no more than 95 % and sub strate temperature must be at least 5 °F (3 °C) above measured dew point temperature.
- Minimum ambient and substrate temperature during application and curing of material is 50 °F (10 °C); maximum is 95 °F (35 °C).
- Do not store materials outdoors directly exposed to sunlight and moisture. Cover and protect materials with breathable type covers.
- Do not thin with solvents.
- Minimum age of concrete must be 21–28 days, depending on curing and drying conditions.
- Any repairs required to achieve a level surface must be performed prior to application (consult a Sika Representative for guidance on various product solutions). Surface irregularities may reflect through the cured system.
- Do not apply to a porous or damp surface where moisture vapor transmission will occur during application and cure.
- Substrate must be dry prior to application. Do not apply to a frosted, wet or damp surface. Do not proceed if rain is imminent within 8-12 hours of application. Allow sufficient time for the substrate to dry after rain or inclement weather as there is the potential for bonding problems.
- When applying over existing coatings compatibility and adhesion testing is recommended.
- Precautions should be taken to prevent odors and/or vapors from entering the building/structure, including but not limited to turning off and sealing air intake vents or other means of ingress for odors and for vapors into the building/structure during product application and cure.
- Opening to vehicles/pedestrians or installation of separate wear course prior to final cure may result in loss of aggregate, or permanent staining and subsequent premature failure.
- Vehicle fluids and some high performance tires can stain the coating. Fluid spills should be removed promptly as the coating can in some cases be damaged from prolonged exposure.
- On grade, lightweight concrete, asphalt pavement, or insulated split slab applications, or applications where chained or studded tires may be used should not be coated with Sikalastic® Traffic Systems.
- Unvented metal pan decks or decks containing a between-slab membrane require further technical evaluation and priming with a moisture-tolerant primer - contact Sika regarding recommendations.
- Waterproofing applications under overburden, including concrete pavement, and tile in a cementitious setting bed, require further technical evaluation - contact Sika regarding recommendations.
- Do not subject to continuous immersion.
- Sikalastic®-715 LoVOC Textured is UV resistant, but will chalk, fade or discolor over time when exposed to UV and under certain artificial lighting conditions. Sikalastic® 736 AL Lo-VOC aliphatic top coat provides superior color and gloss retention.
- Base and intermediate coats must be kept clean and re-coated within 48 hours, or 24 hours if Accelerator or Boosters are used.
- Mockups to verify application methods and substrate conditions as well as desired skid resistance and aesthetics are highly recommended.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

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BUILDING TRUST

This item has been digitally signed and sealed by Zuhair Jalloul, PE, on Nov 30, 2021.
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Florida Consulting Engineers, Inc.

Certificate of Authorization No. 5810

134 N.W. 16TH STREET, SUITE 1
BOCA RATON , FLORIDA 33432

PHONE: (561) 353–1152

E–MAIL:
ZJ@FLCENGINEERS.COM

DATE	REVISIONS

ZUHAIR M. JALLOUL
LICENSE
No. 35416
STATE OF
FLORIDA
PROFESSIONAL ENGINEER

Zuhair M. Jalloul, P.E.
Fl. License. No.: 35416

DATE Nov. 18, 2021
SCALE AS SHOWN
DWNG. BY P.E.S.
CHECKED BY Z. JALLOUL
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall
Balcony Concrete
Repair

535 Park Ave,
Lake Park, FL 33403

CONCRETE
REPAIRS PRODUCT
SPECIFICATIONS

SHEET NUMBER
S-6
OF 6

Structural Engineers **ONM&J** Special Inspectors

O'Donnell, Naccarato, Mignogna Jackson, Inc.

February 27, 2020

Ms. Kristin Kellog
REG Architects, Inc.
300 Clematis Street, 3rd Floor
West Palm Beach, FL 33401

RE: Lake Park Town Hall- Chamber Room
Lake Park, FL
Project No.: 341.144

SUBJECT: STRUCTURAL REVIEW – PRELIMINARY

Pursuant to your request we performed a site visit on February 18, 2020 at the above referenced project. The purpose of this visit was to investigate the reported deflection of the coffer ceiling of the Chamber Room. No destructive testing was performed. Our report will provide the results of our investigation and a design analysis of the roof framing system.

I. Field Investigation

- Refer to partial roof framing plans and existing building sections.

1. Roof 1"x6" wood decking observed to be in satisfactory condition (Exhibits 1, 14,19).
2. The 2"x6" wood roof rafters spanning North South spaced at 24" on center were noted to be in satisfactory condition. (Note hurricane clips: Exhibits1,4,9,13,14)
3. The 3-2"x12" hip rafters at the South West, corner were in satisfactory condition.(Exhibits 3,6,7,9,20)
4. The wood trusses, 6"x6" top chord, 4"x4" diagonal web members and the vertical 3/4" steel tension rods were observed to be in satisfactory condition. (Exhibits 2,4,21)
5. The 6"x10" wood beams spanning East to West, truss to truss were noted to be in satisfactory condition. The roof rafters have straps fasteners to the beams. (Exhibits 1,2,5,13,15,19,22,23)
6. 2"x8" ceiling beams spanning East to West to the truss bottom chord, spaced 16" on center were observed to be in satisfactory condition.
7. Note 4"x4" wood post wedged between plate at ceiling joists and hip rafter (exhibit 11)
8. Note connection at truss top chord and tension rod. Joint of diagonal to top chord slightly open. (Exhibit 10)
9. All wood/timber roof framing members were noted to be Dade County pine species. The roof framing member joints and connections were observed to be in satisfactory condition. Our observations were limited to the South, West, and South area of the chamber room roof framing

II. Design Investigation

1. Roof framing:

   Our investigation revealed the 6"x10" wood beams and 2"x6" wood joists (at 24" c/c) are structurally adequate to support the required gravity loads per the current Florida Building code.

   The 3- 2"x12" hip wood beams (maximum span of +/- 26'-0") are supporting a 6"x10" wood beam (+/- 32'-0" long) on one side and a 6"x10" wood beam (+/- 9'-0" long) on the other side. As a result, the hip beam is supporting a point load (approximately mid span). The hip beam was found structurally adequate to support the dead load of the roof, but was found inadequate (+/- 75% over stressed) to support both the dead and live as required by the current code.

In addition, a 4"x4" vertical wood post (+/- 3'-0" high) was found hammered in tight between the bottoms of a hip beam and top of the 2"x8" ceiling joists. (Marked in blue on the enclosed "partial roof framing plan"). This vertical post was also found partially bearing on a lose 2"x wood plate bearing on the ceiling joists. It appears that this additional vertical post was added at a later date due possible deflection issues.

2. Ceiling Joist Framing:
   Our investigation revealed the 2"x8" wood joists at 16" c/c (maximum span of 18'-0") supporting a coffered ceiling system (Pecky Cypress cladding) was found to deflect approximately 1" (5/8" allowed for ceilings)

Conclusion

Overall the Dade County pine wood timber members were found in satisfactory condition except for the following:

1. The hip beams (3-2"x12") will require additional reinforcement to properly support the roof loads per current Florida Building code.
2. The ceiling wood joist (2"x8" at 16" c/c) spanning +/- 18'-0" will require additional reinforcement to mitigate future deflections.
3. An attempt was made to harden the roof framing with plumbing straps/ clips with minimal fasteners. A complete wind analysis will be required to properly determine size/type of required uplift straps/clips.
4. Further field investigation will be required to access the Northwest corner of the Chamber Room to determine if a similar condition is occurring in this area. This area was at a distance from the attic access opening and was not easily accessible at the time of our visit.

Further design investigation on the Westerly wood truss will be required to determine its structural adequacy to support the hip beams/roof framing.

In addition, It would be beneficial if access to the deflected area of the Pecky Cypress coffered ceiling was provided for investigate the area.

General Notes

This report is based upon information provided by REG Architects, Inc. and the existing drawings. We render no opinion with regards to structural elements that were concealed.

Please feel free to contact this office should you have any questions regarding this matter.

O'DONNELL, NACCARATO, MIGNOGNA & JACKSON, INC.

Joseph Mincuzzi, P.E.
Vice President
STATE OF FLORIDA:
Registered Professional Engineer No. 38162
Registered Special Inspector No. 0952
Registered Professional Inspector No. BN-0002673

John Dawson, BSCE
Senior Engineer

Enclosed: Photographs
Partial Roof Framing Plan
Existing Building Cross Section – North South & East West

PROJECT: Lake Park Historic Town Hall **JOB NO: 341.144**

PHOTO NO:	DESCRIPTION
1	**Typical** roof deck **plank,** roof **rafters,** roof **beams,** roof truss, **ceiling** beams.
2	Roof beams, tension rod, x bracing
3	Roof rafters, x tross bracing, new metal stud wall for mechanical
4	**Roof** framing at truss- Note tension rod. **Note:** tie down hurrican strap .
5	Ceiling beams, x truss bracing.
6	**Joint** at ridge, truss, hip rafters
7	**Roof** deck, roof rafters, hip rafters note: splice plate.
8	Post (added later) hip rafter to ceiling beams
9	**Hip** rafter(8M), roof rafters- braces to ceiling beams.
10	Hurrican tie down strap, truss joint, tension road
11	Post (top-added) at hip rafter.
12	**Roof** rafters, hip rafter, roof beam, truss tension road
13	Roof rafters, truss, wood beams. Note: Hurricane tie down.
14	Roof decking, roof raters on beams. Note- hurricane tie down.
15	**Roof** rafters roof beam, ceiling beams, roof deck, note: hurricane tie downs.
16	Ceiling beams
17	**Roof rafters, hip rafters/** beam **joint**
18	**Opposite** view of Exhibit 17
19	Roof deck , roof **rafters,** roof beam . Note: hurricane tie downs
20	**Roof rafters,** roof **hip** rafter **joint** at roof deck
21	Roof **hip beam,** roof **rafters,** roof truss
22	Roof rafters at **peak,** roof beam **(Note:** Hurricane tie downs), roof **hip** rafter.
23	**Roof rafters,** roof beam (Note: **hurricane,clips, ceiling beams,** roof truss.

Y2

FEBRUARY 28, 2020

MS KRISTIN KELLOG,
L.E.G. ARCHITECTS, INC.
300 CLEMATIS STREET, 3RD FLOOR
WEST PALM BEACH, FL 33401

RE: LAKE PARK TOWN HALL- CHAMBER ROOM
LAKE PARK, FLORIDA
PROJECT #: 341.144

PURSUANT TO YOUR REQUEST WE PERFORMED A SITE VISIT ON FEBRUARY 18, 2020 AT THE ABOVE REFERENCED PROJECT. THE PURPOSE OF THIS VISIT WAS TO INVESTIGATE THE REPORTED DEFLECTION OF THE COFFER CEILING OF THE CHAMBER ROOM. NO DESTRUCTIVE TESTING WAS PERFORMED. OUR REPORT WILL PROVIDE THE RESULTS OF OUR INVESTIGATION AND A DESIGN ANALYSIS OF THE ROOF FRAMING SYSTEM.

FIELD INVESTIGATION

REFER TO PARTIAL ROOF FRAMING PLAN AND EXISTING BUILDING SECTIONS

1. ROOF 1"X6" WOOD DECKING OBSERVED TO BE IN SATISFACTORY CONDITION) (EXHIBITS 1, 13, 14, 18, 19)
2. THE 2"X6" WOOD ROOF RAFTERS (SPANNING NORTH SOUTH) SPACED AT 24" ON CENTER WERE NOTED TO BE IN SATISFACTORY CONDITION). (NOTE HURRICANE CLIPS: EXHIBITS1, 4, 9, 13, 14)
3. THE 3-2"X12" HIP RAFTERS AT THE SOUTH WEST, SOUTH EAST CORNER WERE IN SATISFACTORY CONDITION

(EXHIBIT'S 6, 7, 9, 20)

4. THE WOOD TRUSSES, 6"X6" TOP CHORD, 4"X4" DIAGONAL WEB MEMBERS AND THE VERTICAL 3/4" Ø STEEL TENSION) RODS WERE OBSERVED TO BE IN SATISFACTORY CONDITION. (EXHIBITS 2, 4, 10, 21)
5. THE 6"X10" WOOD BEAMS SPANING (EAST TO WEST) TRUSS TO TRUSS WERE NOTED TO BE IN SATISFACTORY CONDITION. THE ROOF RAFTERS HAVE HURRICAN FASTNERS TO THE BEAMS (EXHIBITS 1, 2, 5, 13, 15, 19, 22, 23)
6. 2"X8" CEILING BEAMS SPANING EAST TO WEST TO THE TRUSS BOTTOM CHORD, SPACED 16" ON CENTER WERE DESIGNED TO BE IN SATISFACTORY CONDITION.

ALL WOOD/TIMBER ROOF FRAMING MEMBERS WERE NOTED TO BE DADE COUNTY SPECIES. THE (ROOF FRAMING MEMBER JOINTS AND CONNECTIONS WERE OBSERVED TO BE IN SATISFACTORY CONDITION). OUR OBSERVATIONS WERE LIMITED TO THE SOUTH-WEST, AND SOUTH AREA OF THE CHAMBER ROOM ROOF FRAMING.

O'DONNELL, NACCARATO, MIGNOGNA & JACKSON, INC.
1655 Palm Beach Lakes Blvd., Suite 204
WEST PALM BEACH, FLORIDA 33401
(561) 835-9994

JOB
SHEET NO. OF
CALCULATED BY DATE
CHECKED BY DATE
SCALE

CONCLUSION

4. FURTHER FIELD INVESTIGATION WILL BE REQUIRED TO ACCESS THE NORTHWEST CORNER OF THE CHAMBER ROOM TO DETERMINE IF SIMILAR CONDITION ARE OCCURING IN THIS AREA. THIS AREA WAS AT A DISTANCE FROM THE ATTIC ACCESS OPENING AND WAS NOT EASILY ACCESSIBLE AT THE TIME OF OUR VISIT.

FURTHER DESIGN INVESTIGATION ON THE WESTERLY WOOD TRUSSES WILL BE REQUIRED TO DETERMINE ITS STRUCTURAL ADEQUACY TO SUPPORT THE HIP BEAMS/ROOF FRAMING.

IT WOULD BE BENEFICIAL IF ACCESS TO THE DEFLECTED AREA OF THE PECKY CYPRESS COFFERED CEILING WAS PROVIDED FOR INVESTIGATION.

ENCL: PHOTOGRAPHS
PARTIAL ROOF FRAMING PLAN
EXISTING BUILDING CROSS SECTION - NORTH SOUTH AND EAST-WEST

REG
Architects
Interiors
Planners
CORP# AA0002447

Est. 1988

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P (561) 659-2383
www.regarchitects.com

TOWN OF LAKE PARK WELCOME

Historical Resources

Town Hall Structural Roof Replacement & Exterior Restoration

535 Park Avenue, Lake Park, FL 33403

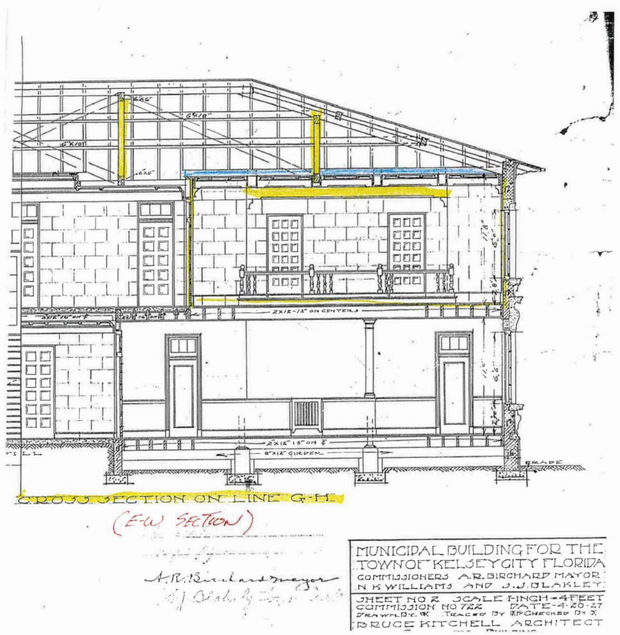
NO.	DATE	DESCRIPTION

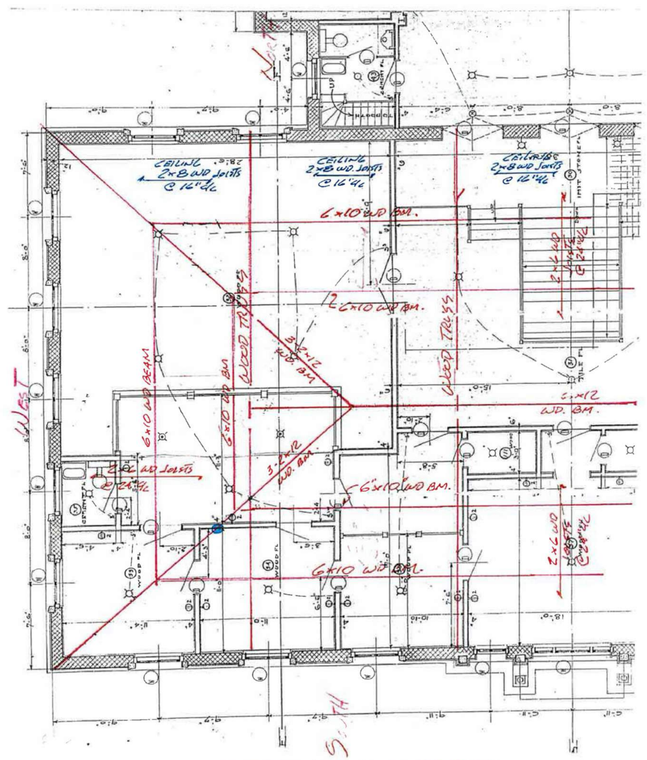
DATE:	04.10.2023
MODELED:	N/A
CHECKED:	By Others
REG PROJECT #:	22029

STRUCTURAL REPORT

Construction Document Set

SR-1





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Historical Resources

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535 Park Avenue, Lake Park, FL 33403

NO.	DATE	DESCRIPTION

DATE:	04.10.2023
MODELED:	N/A
CHECKED:	By Others
REG PROJECT #:	22029

STRUCTURAL REPORT

Construction Document Set

SR-2

Exhibit 1

Exhibit 2

Exhibit 3

Exhibit 4

Exhibit 5

Exhibit 6

Exhibit 7

Exhibit 8

Exhibit 9

Exhibit 11

Exhibit 13

Exhibit 15

Exhibit 10

Exhibit 12

Exhibit 14

Exhibit 16

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REG PROJECT #:	22029

STRUCTURAL REPORT

Construction Document Set

SR-3

Exhibit 17

Exhibit 18

Exhibit 19

Exhibit 20

Exhibit 21

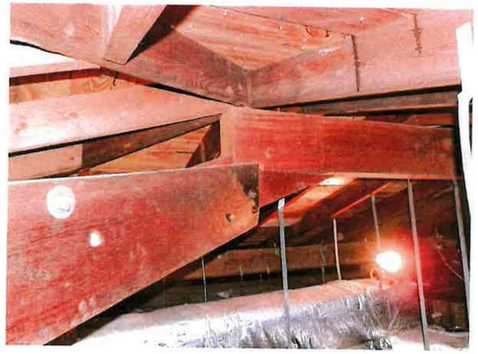


Exhibit 22

Exhibit 23

REG
Architects
Interiors
Planners
CORP# AA0002447

Est. 1988

Rick Gonzalez, AIA
President
FL License AR0014172
120 South Olive Ave. Ste. 210,
West Palm Beach, FL 33401
P (561) 659-2383
www.regarchitects.com

TOWN OF LAKE PARK WELCOME

Historical Resources

Town Hall Structural Roof Replacement & Exterior Restoration

535 Park Avenue, Lake Park, FL 33403

NO.	DATE	DESCRIPTION

DATE:	04.10.2023
MODELED:	N/A
CHECKED:	By Others
REG PROJECT #:	22029

STRUCTURAL REPORT

Construction Document Set

SR-4

GENERAL NOTES

1. CONTRACTOR SHALL MAKE A SITE VISIT PRIOR TO SUBMITTING A BID FOR THE PROJECT. PRIOR TO THE START OF CONSTRUCTION THE CONTRACTOR SHALL VERIFY THE SITE EXISTING CONDITIONS.
2. THE CONTRACTOR IS RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS REQUIRED FOR RESTORATION.
3. ALL WORK PERFORMED UNDER THE CONTRACT SHALL COMPLY WITH THE REQUIREMENTS OF THESE PLANS & ACCOMPANYING PROJECT SPECIFICATIONS, & ALL REFERENCES CITED WITHIN THE PROJECT SPECIFICATIONS. THE CONTRACT WITH THE OWNER SHALL GOVERN & SUPERCEDE OVER REFERENCED SPECIFICATIONS. MEANS OF MEASUREMENT & PAYMENT SHALL BE AS SET FORTH BY THE OWNER & STATED IN THE CONTRACT.
4. THESE NOTES ARE INTENDED TO ADD CLARIFICATION & SUPPLEMENT PROJECT SPECIFICATIONS, & ARE NOT INTENDED TO REPLACE SPECIFICATIONS. SEE PROJECT SPECIFICATIONS ADDITIONAL REQUIREMENTS TO THESE NOTES.
5. ANY & ALL SAFETY REGULATIONS ARE TO BE STRICTLY ADHERED TO. METHODS OF CONSTRUCTION & INSTALLATION OF STRUCTURAL ELEMENTS & CONSTRUCTION MATERIAL ARE THE RESPONSIBILITY OF THE CONTRACTOR.
6. THE CONTRACTOR SHALL MAINTAIN A CLEAN & SAFE JOB SITE. DEMOLISHED MATERIALS & CONSTRUCTION-GENERATED DEBRIS SHALL BE REMOVED DAILY. DISPOSAL OF SAID MATERIALS IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. CONSTRUCTION DEBRIS SHALL BE DISPOSED OF IN AN APPROVED SANITARY LANDFILL.
7. AS PART OF PERMIT CONDITIONS, THE CONTRACTOR MAY BE REQUIRED TO EMPLOY CONSTRUCTION DEBRIS CONTROL MEASURES SUCH AS FENCES & OTHER DEVICES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CLEAN-UP OF ANY PROJECT-GENERATED DEBRIS LOCATED OUTSIDE THE IMMEDIATE WORK AREA.
8. THE CONTRACTOR SHALL ABIDE BY ALL APPLICABLE LOCAL, STATE, AND FEDERAL ENVIRONMENTAL PROTECTION STANDARDS, LAWS, & REGULATIONS.
9. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO REPORT IMMEDIATELY TO THE ENGINEER ANY & ALL UNEXPECTED OBSTACLES, OBSTRUCTIONS, DEBRIS, CONDUITS, CABLES, PIPELINES, TANKS, OR ARTIFACTS UNEARTHED DURING CONSTRUCTION.
10. THE CONTRACTOR SHALL BE RESPONSIBLE FOR BRINGING ALL FACETS OF THE PROJECT IN COMPLIANCE WITH & IN CONFORMANCE WITH THESE PLANS & SPECIFICATIONS. IF ANY MODIFICATIONS TO THE PLAN IS DEEMED NECESSARY BY THE CONTRACTOR, THE CONTRACTOR SHALL SUBMIT PROPOSED CHANGES IN WRITING TO THE ENGINEER FOR APPROVAL.
11. THE CONTRACTOR SHALL LOCATE ALL EXISTING UTILITIES IN THE AREA OF CONSTRUCTION PRIOR TO COMMENCING WITH CONSTRUCTION. CONTRACTOR SHALL NOTIFY THE ENGINEER IN THE EVENT PROJECT ELEMENTS CONFLICT WITH UTILITIES.
12. THE CONTRACTOR SHALL REMOVE ALL CONSTRUCTION EQUIPMENT, STAGING & OTHER TEMPORARY STRUCTURES AT THE COMPLETION OF THE PROJECT.
13. IF DURING PROJECT CONSTRUCTION ANY DAMAGE TO STATE, COUNTY, OR LOCAL INFRASTRUCTURE INCLUDING, BUT NOT LIMITED TO ROADS, SIDEWALKS, & UTILITIES IS CAUSED BY CONSTRUCTION ACTIVITIES RELATED TO THIS PROJECT, REPAIRS SHALL BE MADE BY THE CONTRACTOR & APPROVED BY THE ENGINEER.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ADHERING TO ALL CONDITIONS OF ENVIRONMENTAL & BUILDING PERMITS CONDITIONS & COMPLYING TO REQUITE REPORTING REQUIREMENTS.

DEMOLITION NOTES

1. DO NOT SAW CUT ANY STRUCTURAL COMPONENT OF OR DO ANY WORK THAT MAY IN ANY MANNER DIMINISH THE STRUCTURAL INTEGRITY OF THE EXISTING BEAMS, JOISTS, COLUMNS, OR CONC. SLABS; OR THE BUILDING IN GENERAL.

2. THE DEMOLITION INDICATED IS INTENDED TO SHOW THE GENERAL SCOPE OF DEMOLITION WORK & IS DIAGRAMMATIC IN NATURE. G.C. TO PERFORM ALL WORK REQUIRED FOR THE SATISFACTORY COMPLETION OF THE INTENT OF THE SCOPE OF WORK INDICATED IN THE DRAWINGS. THE INTENT OF THE DRAWINGS IS TO COMPLETE ALL DEMOLITION AS REQUIRED TO COMPLETE THE PROPOSED NEW CONSTRUCTION & THE G.C. SHALL BE RESPONSIBLE FOR SUCH.

3. THE CODES HAVING JURISDICTION SHALL BE OBSERVED STRICTLY IN THE DEMOLITION ON THE PROJECT, INCLUDING ALL APPLICABLE STATE, CITY, COUNTY BUILDING, ZONING, ELECTRICAL, MECHANICAL, PLUMBING, LIFE SAFETY AND FIRE CODES. CONTRACTOR SHALL VERIFY ALL CODE REQUIREMENTS & THE DEMOLITION DOCUMENTS & BRING ANY DISCREPANCIES TO THE ATTENTION OF THE ARCHITECT.

4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING ALL REQUIRED DEMOLITION & TRADE PERMITS & THEIR RESPECTIVE COSTS.

5. THE CONTRACTOR SHALL VISIT THE PROJECT SITE PRIOR TO DEMOLITION &/OR CONTRACT NEGOTIATIONS & SHALL VERIFY EXISTING CONDITIONS WITH THE DEMOLITION DOCUMENTS. DISCREPANCIES BETWEEN DEMOLITION DOCUMENTS (& THEIR INTENT) SHALL BE BROUGHT TO THE ENGINEER'S ATTENTION FOR CLARIFICATION. BIDS SHALL NOT BE SUBMITTED OR CONTRACTS NEGOTIATED BY THE CONTRACTOR PRIOR TO CLARIFICATION OF THE INTENT OF THE DEMOLITION DOCUMENTS WHERE SUCH INTENT IS IN DOUBT.

6. THE CONTRACTOR SHALL MAINTAIN THE PREMISE CLEAN & FREE OF TRASH DEBRIS & SHALL PROTECT ALL ADJACENT WORK FROM DAMAGE, SOILING, ETC. ALL REMAINING FACILITIES SHALL BE LEFT CLEAN & READY FOR CONSTRUCTION UPON COMPLETION OF DEMOLITION.

7. SHUTOFF, CAP & OTHERWISE PROTECT PUBLIC UTILITY LINES IN ACCORDANCE WITH THE REQUIREMENTS OF THE PUBLIC AGENCY OR UTILITY HAVING JURISDICTION.

8. USE THE MEANS NECESSARY TO PREVENT DUST FROM BECOMING A NUISANCE.

9. G.C. TO PATCH & REPAIR GWB AT ALL LOCATIONS WHERE THE EXISTING SURFACE IS NOT STRAIGHT & TRUE.

10. ALL AREAS AFFECTED / DAMAGED BY ANY DEMO WORK SHALL BE REPAIRED TO LIKE NEW CONDITION BY THE G.C.

WATER PROOFING NOTES

1. USE SIKA Sikalastic®-710 NP Base, AS BASE COAT OR EQUAL PER SPECIFICATIONS
2. USE SIKA Sikalastic®-715 LoVOC Textured FOR TOP COAT OR EQUAL PER SPECIFICATIONS
3. USE ALL MATERIALS WITH STRICT COMPLIANCE WITH MANUFACTURER'S SPECIFICATION AND REQUIREMENTS

TYPICAL SPALLED CONCRETE REPAIR

SC-1 THE CONTRACTOR SHALL LOCATE ALL SPALLS AS PER PLANS & LOCATE ANY OTHER SPALLS ADJACENT TO THE ONES SHOWN ON PLAN BY SOUNDING THE CONCRETE SURFACES USING A HAMMER. SUSPECTED AREAS OF DELAMINATION SHALL BE MARKED WITH CHALK OR PAINT.

SC-2 DELAMINATED, SPALLED, & UNSOUND CONCRETE AREAS SHALL HAVE THEIR MARKED BOUNDARIES SAW-CUT TO A MINIMUM DEPTH OF 2 1/2" INTO THE CONCRETE SURFACE. ALL EDGES SHALL BE STRAIGHT & PATCHED AREAS ARE TO BE AS SQUARE & RECTANGULAR AS POSSIBLE.

SC-3 CONCRETE SHALL BE REMOVED USING A 15# CHIPPING HAMMER.

SC-4 WHERE REINFORCEMENT IS EXPOSED BY CONCRETE REMOVAL , EXTRA CAUTION SHALL BE EXERCISED TO AVOID DAMAGING DURING REMOVAL OF ADDITIONAL UNSOUND CONCRETE.

SC-5 IF SCALE IS PRESENT ON REINFORCEMENT, ADDITIONAL CONCRETE SHALL BE REMOVED UNTIL CLEAN, SOUND REINFORCEMENT IS FOUND.

SC-6 UPON REMOVAL OF ALL DAMAGED CONCRETE , & PRIOR TO STARTING REPAIR, A REVIEW BY THE ENGINEER OF RECORD SHALL BE CONDUCTED.

SC-7 ALL EXPOSED CONCRETE & STEEL SHALL BE WIRE BRUSHED & CLEANED & TREATED WITH SIKA "ARMATEC" 110 EPOCEM.

SC-8 THE CUT AREA OF THE CONCRETE SHALL BE CLEAN & DRY PRIOR TO COMMENCEMENT OF PATCHING

SC-9 REPAIRS FOR SPALLS :

A. THE EXISTING CONCRETE SURFACE IS TO BE PREPARED IN A SATURATED, SURFACE DRY CONDITION JUST PRIOR TO PLACEMENT OF THE REPAIR MORTAR.

B. THE MIXED "SIKATOP 123" PLUS MORTAR OR SIKA 1000 MUST BE WORKED WELL WITH THE CONCRETE SURFACE FILLING ALL PORES & VOIDS. FORCE MATERIAL AGAINST CONCRETE SURFACE FILLING ALL PORES & VOIDS. FORCE MATERIAL AGAINST EDGE OF REPAIR, WORKING TOWARD CENTER. THOROUGHLY COMPACT THE MORTAR AROUND EXPOSED REINFORCEMENT. WHEN MULTIPLE LIFTS ARE REQUIRED (APPLICATION THICKNESS MAXIMUM 5" PER LIFT) SCORE TOP SURFACE ON EACH LIFT TO PRODUCE A ROUGHENED SUBSTRATE FOR NEXT LIFT. ALLOW PRECEDING LIFT TO HARDEN BEFORE APPLYING FRESH MATERIAL. SATURATE SURFACE OF THE LIFT WITH CLEAN WATER. IF PREVIOUS LAYERS ARE OVER 48 HOURS OLD, MECHANICALLY PREPARE THE SUBSTRATE. DAMPEN & APPLY BONDING AGENT OR SCRUB COAT PRIOR TO THE NEXT APPLICATION OF MORTAR.

DIMENSIONS

CONTRACTOR SHALL FIELD VERIFY ALL DIMENSIONS PRIOR TO FABRICATION AND/OR ORDERING MATERIAL. IN CASE OF ANY DISCREPANCY NOTIFY THE ENGINEER OF RECORD.

SCOPE OF WORK

1. SECURE THE AREA AS PER THE INSTRUCTIONS OF REGULATORY AGENCIES.
2. PERFORM DEMOLITION ON PORTION OF THE COMPONENTS TO REPAIR OR REBUILD AS PER ENGINEER ON RECORD'S INSTRUCTIONS.
3. PERFORM REPAIRS AS PER THE SPECIFICATIONS AND PERMITTED DOCUMENTS
4. FINISH TO MATCH EXISTING FINISH ON THE REPAIRED AREAS.
5. PAINT THE REPAIRED AREAS, PAINT COLOR TO MATCH EXISTING.
6. CLEAN THE AREA AND HALLWAY DEBRIS.
7. QUALITY OF FINISHES SHALL MATCH EXISTING AND SHALL SATISFY THE REQUIREMENTS OF THE CITY AT LAKE PARK AND THE ENGINEER OF RECORD
8. SHAPE OF REPAIRED BEAMS AND EDGE OF FLOOR SLAB SHALL MATCH EXISTING GEOMETRIC SHAPE, SIZE AND FINISH.

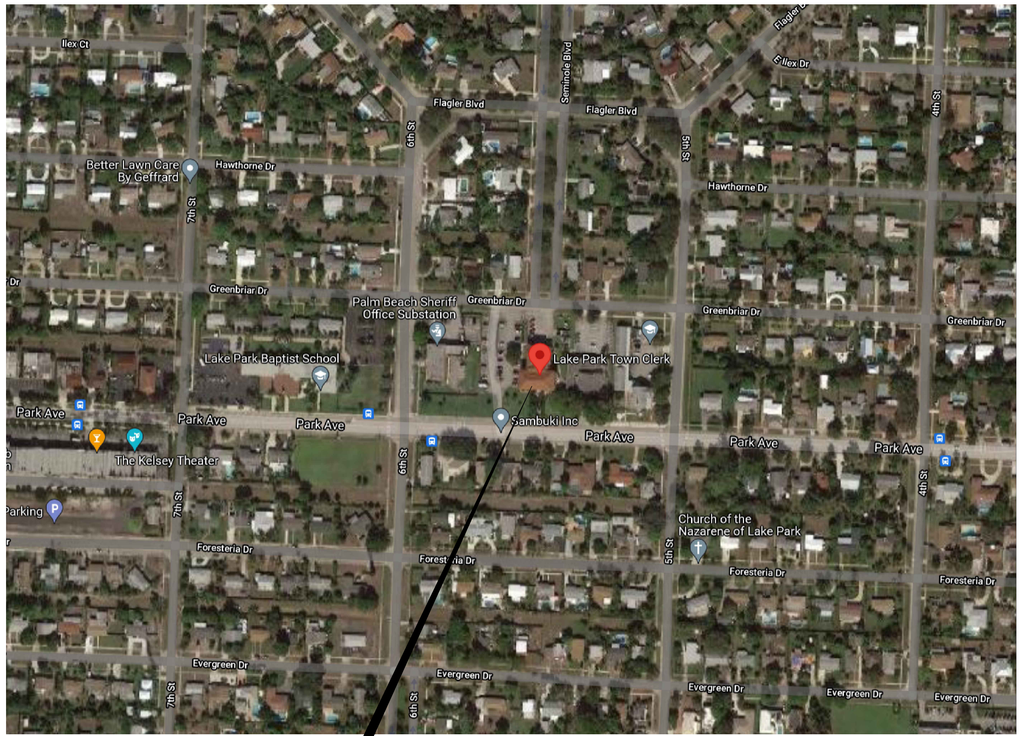
STRUCTURAL DESIGN CRITERIA & CODES

THE STRUCTURE HAS BEEN DESIGNED IN ACCORDANCE WITH THE

FLORIDA BUILDING CODE (FBC) 2020, 7TH EDITION
OCCUPANCY MULTI-FAMILY RESIDENTIAL GROUP R-2
BUILDING CONSTRUCTION TYPE III-A
LEVEL I ALTERATION PER FBC
3 STORY BUILDING AND 1 STORY GARAGE BUILDING

DRAWING INDEX

LOCATION MAP NOT TO SCALE



AREA OF WORK

N

SHORING AND GENERAL NOTES

1. PROVIDE ADEQUATE SHORING TO SUPPORT THE EXISTING BUILDING STRUCTURE AND SECURE THE REPAIR AREA PRIOR TO ANY CUTTING OF CHISELING. ANY DAMAGE CAUSE BY THE CONCRETE REPAIR OPERATION SHALL BE REPAIRED BY THE CONTRACTOR IMMEDIATELY. THE CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR ALL SAFETY MEASURES TO PROTECT THE BUILDING, RESIDENTS, VISITOR, PEDESTRIAN, VEHICLES, NEIGHBORING BUILDINGS FROM ALL HARM DUE THE CONSTRUCTION OPERATION.
2. SAW CUT ALL EDGES.
3. DO NOT CUT EXISTING REBARS UNLESS DIRECTED BY THE ENGINEER OF RECORD.
4. ADD REBARS AS DIRECTED BY THE ENGINEER OF RECORD.
5. COAT ALL REBARS WITH WITH PRIMER (SIKA ARMETEC OR APPROVED EQUAL).
6. INSTALL CONCRETE FORMS AS REQUIRED.
7. POUR CONCRETE PER MANUFACTURER'S SPECIFICATIONS, WET ALL EXISTING CONCRETE EDGES AND SURFACES PRIOR TO NEW POUR.
8. CURE CONCRETE PER SPECIFICATIONS.
9. RESTORE ALL REPAIR AREA FINISH SURFACES TO MATCH EXISTING.
10. ALL COSTS OF THE ABOVE SHALL BE INCLUDED AS A LUMP SUM BASED ON CONTRACTOR'S FIELD MEASUREMENTS.
11. PAINT (PRIME AND PAINT) ALL REPAIRED AREAS TO MATCH EXISTING.
12. ALL BIDDERS SHALL VISIT THE SITE AND CALCULATE QUANTITIES OF REQUIRED REPAIRS TO BE A BASE FOR THE LUMP SUM BID AMOUNT.

Florida Consulting Engineers, Inc.

Certificate of Authorization No. 5810

134 N.W. 16TH STREET, SUITE 1
BOCA RATON , FLORIDA 33432

PHONE: (561) 353-1152

E-MAIL: ZJ@FLCENGINEERS.COM

DATE	REVISIONS

ZUHAIR M. JALLOUL LICENSE No. 35416 STATE OF FLORIDA PROFESSIONAL ENGINEER

Zuhair M. Jalloul, P.E.
Fl. License. No.: 35416

DATE Nov. 18, 2021
SCALE AS SHOWN
DWNG. BY P.E.S.
CHECKED BY Z. JALLOUL
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall Balcony Concrete Repair

535 Park Ave,
Lake Park, FL 33403

GENERAL NOTES & LOCATION MAP

SHEET NUMBER
S-1
OF 6

This item has been digitally signed and sealed by Zuhair Jalloul, PE, on Nov 30, 2021.
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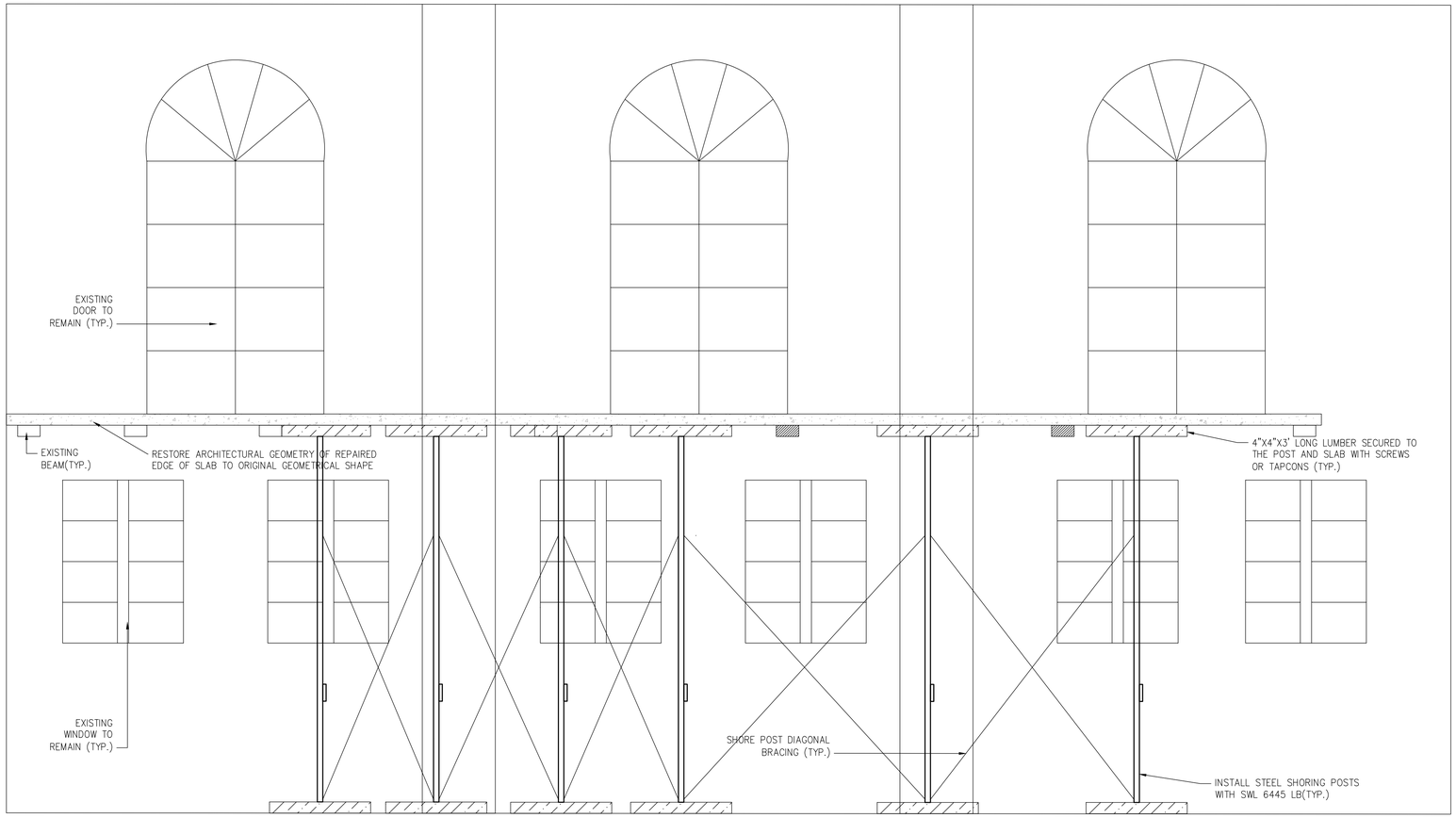
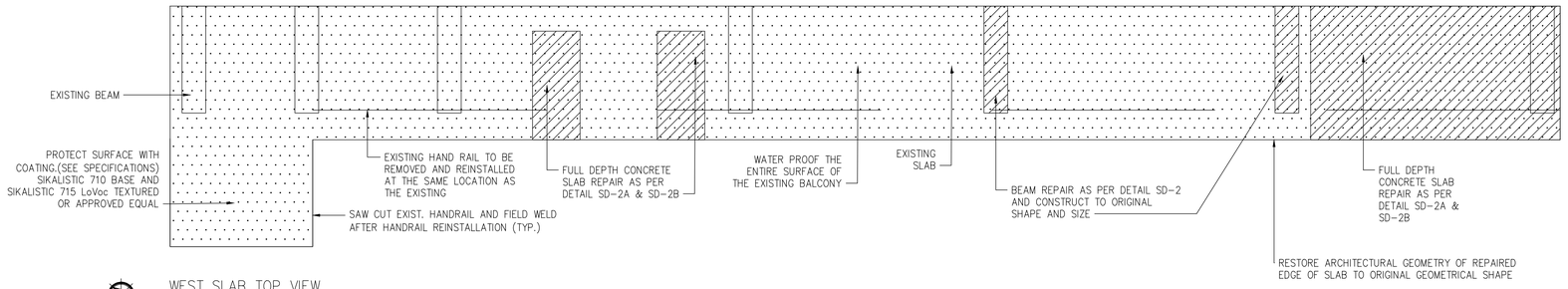


WEST ELEVATION VIEW
SCALE: ½" = 1'-0"



WEST SLAB TOP VIEW
SCALE: ½" = 1'-0"

LEGEND:

- DAMAGED CONCRETE TO BE REPAIRED
- WATER PROOF AREA LIMIT
- EXISTING RAILING

QUANTITIES AND REPAIR SCHEDULE

REPAIR TYPE	UNITS	ESTIMATED QUANTITY
CONC. SLAB & BEAM REPAIR	C.F.	45
WATER PROOFING	S.F.	320

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DATE	REVISIONS
11-9-21	CITY COMMENTS

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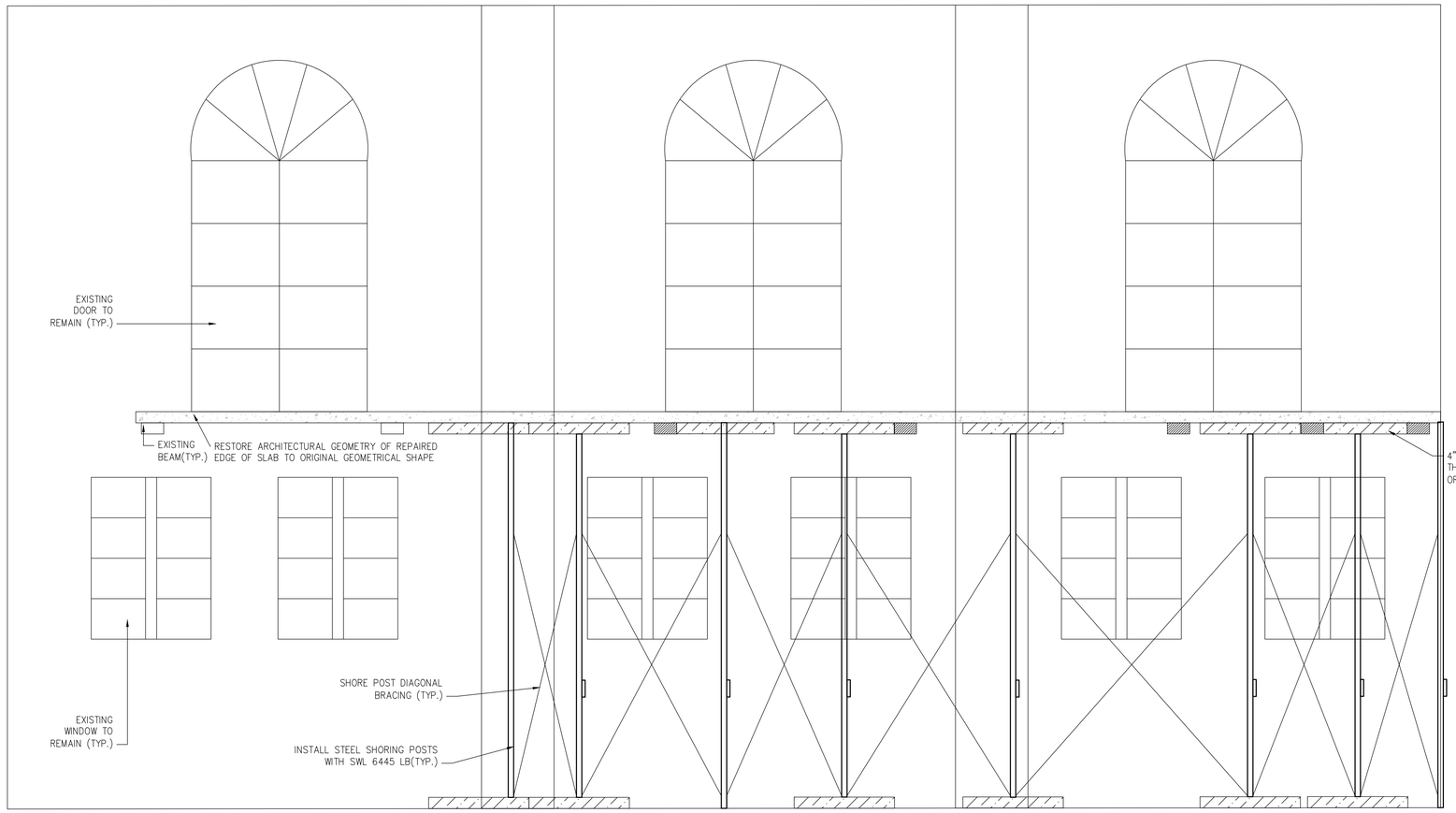
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall Balcony Concrete Repair

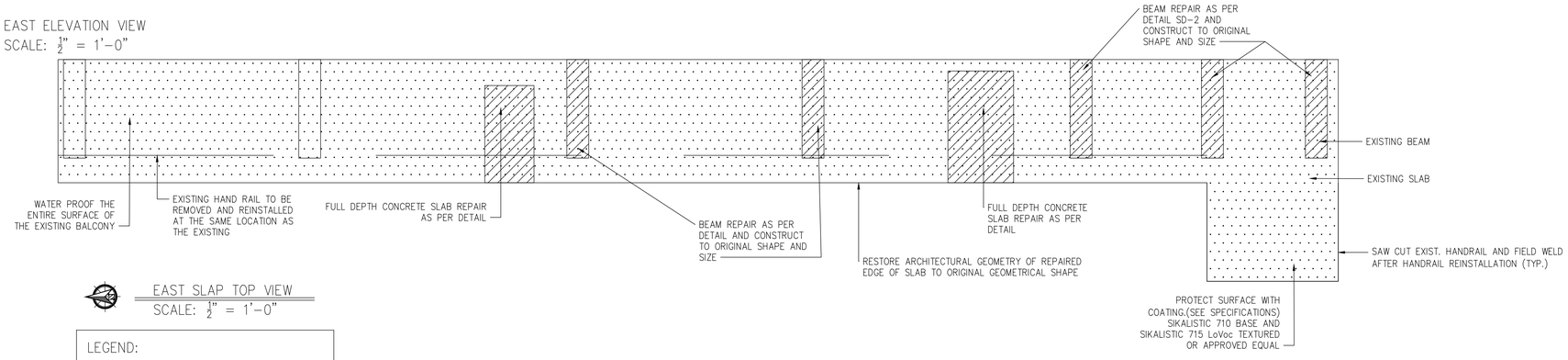
535 Park Ave,
Lake Park, FL 33403

WEST SIDE CONCRETE RESTORATION

SHEET NUMBER
S-2
OF 6



EAST ELEVATION VIEW
SCALE: $\frac{1}{2}$" = 1'-0"



EAST SLAP TOP VIEW
SCALE: $\frac{1}{2}$" = 1'-0"

LEGEND:

- DAMAGED CONCRETE TO BE REPAIRED
- WATER PROOF AREA LIMIT
- EXISTING RAILING

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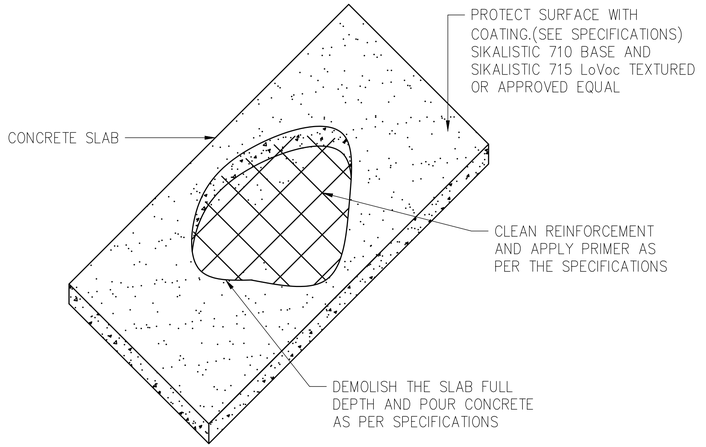
Lake Park Town Hall Balcony Concrete Repair

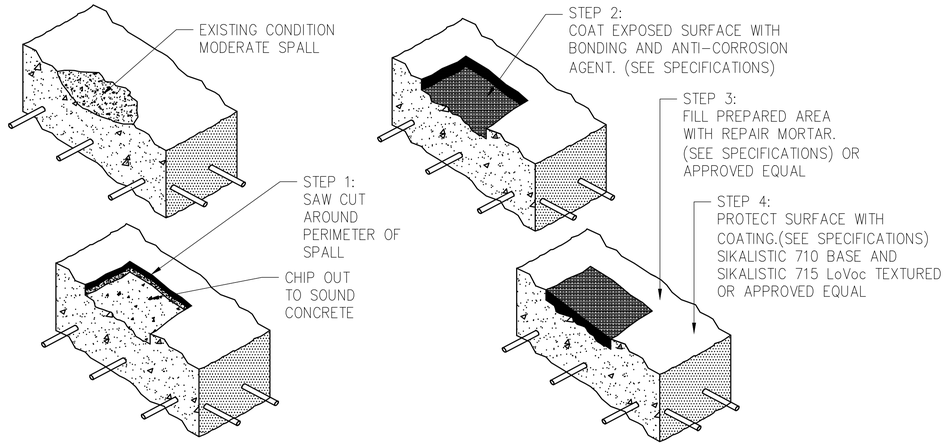
535 Park Ave,
Lake Park, FL 33403

EAST SIDE CONCRETE RESTORATION

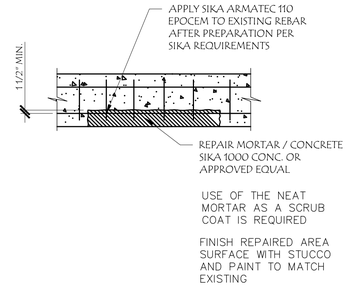
SHEET NUMBER
S-3
OF 6



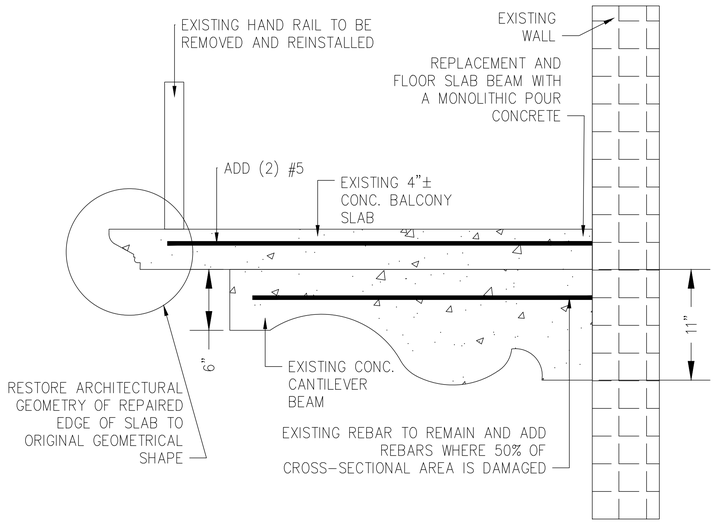
FULL DEPTH SLAB REPAIR



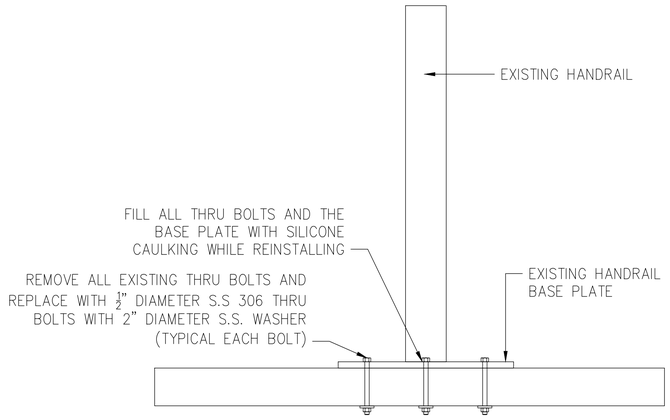
TYPICAL COLUMN & BEAM REPAIR



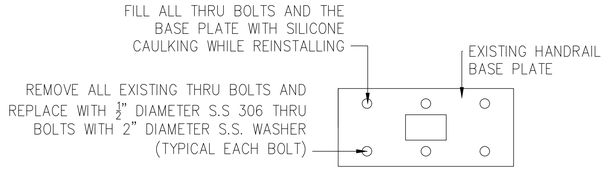
(SD-2B)TYPICAL BEAM REPAIR DETAIL



EXISTING ORIGINAL SLAB BEAM SHAPE (SIDE VIEW)



HANDRAIL BASE PLATE (SIDE VIEW)



HANDRAIL BASE PLATE (TOP VIEW)

CONCRETE REBAR PRIMER

BUILDING TRUST

PRODUCT DATA SHEET

Sika® Armatec®-110 EpoCem

BONDING PRIMER AND REINFORCEMENT CORROSION PROTECTION

PRODUCT DESCRIPTION

Sika® Armatec®-110 EpoCem is a cementitious epoxy resin compensated 3-component, solvent-free, coating material with corrosion inhibitor, used as bonding primer and reinforcement corrosion protection.

USES

- Suitable in concrete repair as corrosion protection for reinforcement
- Suitable as a bonding primer on mortar, steel, and on placing fresh, plastic concrete to existing hardened concrete
- Protection to reinforcing steel in areas of thin concrete cover

CHARACTERISTICS / ADVANTAGES

- Contains EpoCem® technology - improved bonding agent
- Extended open times for repair mortars
- Excellent adhesion to concrete and steel
- Contains corrosion inhibitor
- Good resistance to water and chloride penetration
- High shear strength
- Long pot life
- Can be brushed on or applied using spray gun
- Can be used exterior on-grade
- Excellent bonding bridge for cement or epoxy based repair mortars
- High strength, unaffected by moisture when cured
- Non-flammable, solvent free

PRODUCT INFORMATION

Chemical Base	Portland cement, epoxy resin, selected aggregates and additives.				
Packaging	**Unit**	**A**	**B**	**C**	**ABC**
	3.5 gal (13.2 L)	47.6 oz (1.4 L)	122.1 oz (3.6 L)	46.82 lb (21.3 kg)	A + B in carton, C in bag
	1.65 gal (6.2 L)	22.7 oz (0.67 L)	57.6 oz (1.7 L)	5.5 lb (2.5 kg) (4 bags)	Factory-proportioned units in a pail
Appearance / Color	Component A	White liquid			
	Component B	Colorless liquid			
	Component C	Gray powder			
Shelf Life	12 months from date of production if stored properly in original, unopened and undamaged sealed packaging				
Storage Conditions	Store dry at 40–95 °F (4–35 °C)				

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DATE	REVISIONS

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Zuhair M. Jalloul, P.E.
Fl. License. No.: 35416

DATE Nov. 18, 2021
SCALE AS SHOWN
DWNG. BY P.E.S.
CHECKED BY Z. JALLOUL
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall
Balcony Concrete Repair

535 Park Ave,
Lake Park, FL 33403

CONCRETE REPAIRS DETAILS AND PRODUCT SPECIFICATIONS

SHEET NUMBER
S-4
OF 6

Protect Component A and B from freezing. If frozen, discard.
Protect Component C from moisture. If damp, discard.

TECHNICAL INFORMATION

Compressive Strength	3 days	4,500 psi (31.0 MPa)	(ASTM C-109) 73 °F (23 °C) 50 % R.H.
	7 days	6,500 psi (44.8 MPa)	
	28 days	8,500 psi (58.6 MPa)	
Flexural Strength	28 days	1,250 psi (8.6 MPa)	(ASTM C-348) 73 °F (23 °C) 50 % R.H.
Splitting Tensile Strength	28 days	600 psi (4.1 MPa)	(ASTM C-496) 73 °F (23 °C) 50 % R.H.
Tensile Adhesion Strength	**Bond of steel reinforcement on concrete**		
	Sika® Armatec® 110 EpoCem coated	625 psi (4.3 MPa)	(ASTM C-1583) 73 °F (23 °C) 50 % R.H.
	Epoxy coated	508 psi (3.5 MPa)	
	Plain reinforcement	573 psi (4.0 MPa)	
Slant Shear Strength	**Bonding agent properties** (14 d. moist cure, plastic to hardened concrete)		
	Wet on wet	2,800 psi (19.3 MPa)	(ASTM C-882) 73 °F (23 °C) 50 % R.H.
	24 hr. open time	2,600 psi (17.9 MPa)	
Permeability to Water Vapor	Control	7.32 x 10^{-10} ft/sec	
	145 psi (10 bar)	8.92 x 10^{-15} ft/sec	
Diffusion Resistance to Water Vapor	μ H_2O ~100		
Permeability to CO2	μ CO_2 ~14,000		
Corrosion Test	**Time-to-Corrosion Study** • Sika® Armatec®-110 EpoCem more than tripled the time to corrosion • Reduced corrosion rate by over 40 %		

APPLICATION INFORMATION

Fresh Mortar Density	A+B+C ~125 lb/ft³ (~2.0 kg/l)		
Coverage	**Bonding agent**	80 ft²/gal (7.4 m²/l)	
	Corrosion Protection	40 ft²/gal (3.7 m²/l)	
	(Coverage figures do not include allowance for surface profile and porosity or material waste)		
Layer Thickness		**Min. thickness of 1 coat**	**Coat**
	Bonding agent	20 mils	1
	Corrosion Protection	20 mils	2
Product Temperature	65°-75°F (18°-24°C)		
Ambient Air Temperature	40–95 °F (5–35 °C)		
Substrate Temperature	40–95 °F (5–35 °C)		
Pot Life	~ 90 minutes		
Waiting / Recoat Times	Sika repair mortars and non-fast setting concrete can be applied on Sika® Armatec®-110 EpoCem within a maximum time of:		

Compressive Strength	3 hours	1,250 psi (8.6 MPa)	(ASTM C 109) 73° F (23° C), 50% R.H.
	1 day	4,000 psi (27.5 MPa)	
	7 days	5,000 psi (34.5 MPa)	
	28 days	7,000 psi (48.3 MPa)	
Modulus of Elasticity in Compression	28 days	4.6 x 10^6 psi (32 GPa)	(ASTM C-469) 73° F (23° C), 50% R.H.
Flexural Strength	1 day	700 psi (4.8 MPa)	(ASTM C 293) 73° F (23° C), 50% R.H.
	7 days	900 psi (6.2 MPa)	
	28 days	1,000 psi (6.9 MPa)	
Splitting Tensile Strength	1 day	200 psi (1.4 MPa)	(ASTM C 496) 73° F (23° C), 50% R.H.
	7 days	300 psi (2.1 MPa)	
	28 days	400 psi (2.8 MPa)	
Tensile Adhesion Strength	28 days	Approximately 300 psi (2.1 MPa) Substrate failure	(ACI 503R) 73° F (23° C), 50% R.H.
Shrinkage	28 days	0.06%	(ASTM C 157 modified per ASTM C-928) 73° F (23° C), 50% R.H.
Abrasion Resistance	28 days	0.026 inch (0.66 mm) of wear at 1 hour	(ASTM C 779) 73° F (23° C), 50% R.H.
Freeze-Thaw Stability	28 days	98%	(ASTM C 666)
Freeze Thaw De-icing Salt Resistance	50 cycles	0.080 lb / ft² (391 grams / m²)	(ASTM C 672)
Rapid Chloride Permeability	28 days	< 1,000 Coulombs	(ASTM C 1202 / AASHTO T 277) 73° F (23° C), 50% R.H.

APPLICATION INFORMATION

Mixing Ratio	4.5 – 5 pints (2.1 – 2.4 L)		
Coverage	Neat	0.43 ft³ (0.012 m³)	
	Extended with 25 lbs (11.4 kg) of 3/8 inch (10 mm) pea gravel	0.58 ft³ (0.017 m³)	
	(Yield figures do not include allowance for surface profile, porosity or material waste)		
Consumption / Yield / Dosage (PRINT single line)			
Layer Thickness		**Min.**	**Max.**
	Neat	1/4 inch (6 mm)	2 inches (50 mm)
	Extended	1 inch (25 mm)	6 inches (152 mm)
	• Do not feather edge • Do not exceed 7 inches (178 mm) slump when extended		

Temperature	Maximum Waiting Time
80°- 95 °F (26°- 35 °C)	6 hours
65°-79 °F (18°- 26 °C)	12 hours
50°- 64° F (10°- 17° C)	16 hours
40°- 49° F (4°- 9° C)	wet-on-wet

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Concrete
- Free from dust, loose material, surface contamination and materials which reduce bond or prevent suction or wetting by repair materials.
- Delaminated, weak, damaged and deteriorated concrete and where necessary sound concrete shall be removed by suitable means.
- Substrate must be Saturated Surface Dry (SSD) with no standing water.

Steel reinforcement
- Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed by blast cleaning or other means of mechanical abrasion and reinforcement.
- Should be fully exposed and have all corrosion removed.

MIXING

- Sika® Armatec®-110 EpoCem can be mixed with a low-speed (< 250 rpm) electric drill mixer.
- Shake components A and B thoroughly before opening.
- Pour liquid components A and B into a suitable mixing vessel and mix for 30 seconds.
- While still mixing components A and B slowly add powder component C.
- Mix the three components together for a minimum 3 minutes until blend is uniform and free of lumps, minimizing addition of air.
- Mix only the quantity that you can be applied within the pot life.
- DO NOT ADD WATER.

APPLICATION

As reinforcement corrosion protection
- Apply by stiff-bristle brush or spray at 80 ft² /gal.
- Take special care to properly coat the underside of the totally exposed steel.
- Allow coating to dry 2-3 hours at 73 °F, then apply a second coat at the same coverage.
- Allow to dry again before the repair mortar or concrete is applied.
- Pour or place repair within 7 days

As a bonding primer
- Apply using a stiff-bristle brush or broom. To achieve good bond, Sika® Armatec®-110 EpoCem must be applied well into the substrate, filling all pores and ensure complete coverage of all surface irregularities (minimum layer thickness 1/64" (0.5 mm).
- Spray apply with Goldblatt Pattern Pistol or equal equipment.
- Apply the freshly mixed patching mortar or concrete wet on wet, or up to the maximum recommended open time, onto the bonding slurry.

CURING TREATMENT

Sika® Armatec®-110 EpoCem must be protected against contamination and rain until application of the repair mortar.

CLEANING OF TOOLS

Clean all tools and application equipment with water immediately after use. Hardened material can only be mechanically removed.

LIMITATIONS

- Avoid application in direct sun and/or strong wind and/or rain.
- Do not add water.
- Not a vapor barrier.
- Apply only to sound, prepared substrates.
- Not recommended for use with expansive grouts and SikaQuicks
- Use of semi-dry mortars onto Sika® Armatec®-110 EpoCem must be applied "wet on wet"
- When used in overhead applications with hand placed patching mortars, use "wet on wet" for maximum mortar built thickness.
- Substrate profile as specified by the overlay or repair material is still required.
- As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur® Hi-Mod 32.

Product Temperature	65° – 75° F (18° – 24° C)
Ambient Air Temperature	> 40° - 95° F (4° - 35° C)
Substrate Temperature	> 40° - 95° F (4° - 35° C)
Set Time	35 – 85 minutes (ASTM C 266) 73° F (23° C), 50% R.H.
Final Set Time	> 120 minutes (ASTM C 266) 73° F (23° C), 50% R.H.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

- Concrete surface must be clean and sound.
- Remove all deteriorated concrete, dirt, oil, grease, and other bond-inhibiting materials from the area to be repaired.
- Be sure repair area is not less than 1/4" (6 mm) deep.
- Preparation work should be done by high pressure water blast, scabbler or other appropriate mechanical means to obtain an exposed aggregate surface profile of ± 1/8" (3 mm) [minimum CSP-6].
- To ensure optimum repair results, the effectiveness of decontamination and preparation should be assessed by a Tensile Adhesion Strength (pull-off) test.
- Saw cutting perimeter edges of concrete repair area at a dovetail is preferred.
- Substrate should be Saturated Surface Dry (SSD) with clean water prior to application. No standing water should remain during application.
- Rust, scale, mortar, concrete, dust and other loose and deleterious material which reduces bond or contributes to corrosion shall be removed from steel reinforcement.
- Surfaces shall be prepared using abrasive blast cleaning techniques or high pressure water blasting to acheive a bright metal finish.

PRIMING

- Concrete substrate: Prime the prepared substrate with a scrub coat of SikaQuick®-1000 / SikaQuick®-1000 LD prior to placement of the mortar. The repair mortar has to be applied into the wet scrub coat before it dries.
- Reinforcing Steel: Steel reinforcement should be thoroughly prepared by mechanical cleaning to remove all traces of rust. Where corrosion has occurred due to the presence of chlorides, the steel should be high pressure washed with clean water after mechanical cleaning. For priming of reinforcing steel use Sika® Armatec® corrosion protection products (consult current Product Data Sheets).

MIXING

- Wet down all tools and mixer to be used.
- Pour the required amount of clean, potable water [approximately 70° F (21° C)] into a suitably sized and clean mixing container, using a calibrated measuring jug or similar, to ensure strict controlof the water content. Do not over-water.
- Add 1 bag while continuing to mix with a low-speed drill (400 - 600 rpm) and mortar mixing paddle, or in an appropriate morter mixer.
- Once all the powder has been added, mix to a uniform consistency, maximum 3 minutes, until a lump-free blend is achieved.
- Thorough mixing and proper proportioning of the powder and liquide is necessary.
- To help control setting times, colder water may be used in hot weather and warmer water may be used in cold weather.
- Inaccurate proportioning of the powder to liquid will result in a finished product that may not conform to the typical published performance property values.

- **With water or undiluted SikaLatex® R**: Pour 4.5 pints (2.1 L) of liquid into the mixing container. Slowly add powder, mix and adjust as above. Add up to another 1/2 pint (0.24 L) maximum of liquid to achieve desired consistency. Do not over-water.

- **With diluted SikaLatex® R**: SikaLatex® R admixture may be diluted up to 5:1 (water: SikaLatex® R) for projects requiring minimal polymer modification. Pour 4.5 pints (2.1 L) of the mixture into the mixing container. Slowly add powder, mix and adjust as above.

EXTENSION WITH AGGREGATES

- For applications greater than 1" (25 mm) in depth, add 3/8" (10 mm) coarse aggregate.
- The typical addition rate is 25 lbs (11.4 kg) of aggregate per bag. It is approximately 2 gallons (7.6 L) by loose volume of aggregate.
- The aggregate must be non-reactive (reference ASTM C 1260, C 227 and C 289), clean, well graded, Saturated Surface Dry (SSD), have low absorption and high density, and comply with ASTM C 33 size number 8 per Table 2.
- Variances in aggregate may result in different

BASIS OF PRODUCT DATA

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OTHER RESTRICTIONS

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DIRECTIVE 2004/42/CE - LIMITATION OF EMISSIONS OF VOC

A+B+C combined	50 g/l

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strengths.
- Do not use limestone aggregate.
- Do not exceed a slump of 7" (178 mm). This may cause excessive bleeding and retardation and may reduce the strength and performance of the material.

APPLICATION

- A neat mix of SikaQuick®-1000 / SikaQuick®-1000 LD mortar must be scrubbed into the mechanically prepared, SSD substrate. Be sure to fill all pores and voids.
- Force material against edge of repair, working toward center. After filling repair, screed off excess.
- Allow material to set to desired stiffness, then finish with wood or sponge float for a smooth finish, or broom or burlap-drag for a rough finish.
- If a smoother finish is desired, a magnesium float should be used.
- To assist in the finishing process, use SikaFilm® finishing aid. Consult current Product Data Sheet.
- Mixing, placing, and finishing should not exceed 30 minutes maximum.
- Refer to ACI 305, the "Guide to Hot Weather Concreting" or ACI 306, the "Guide to Cold Weather Concreting" when there is a need to place this product while either hot or cold temperatures prevail. Thinner placements will be more sensitive to the temperature conditions.

CURING TREATMENT

- As per ACI recommendations for portland cement concrete, moist curing is required.
- Moist cure with wet burlap and polyethylene, a fine mist of water or with a water based,* compatible curing compound meeting ASTM C 309.
- Curing compounds adversely affect the adhesion of following lifts of mortar, leveling mortar or protective coatings.
- Moist curing should commence immediately after finishing.
- Protect freshly applied mortar from direct sunlight, wind, rain and frost.
- To prevent from freezing, cover with insulating material (e.g. curing blanket).

* Pretesting of curing compound is recommended.

LIMITATIONS

- Avoid application in direct sunlight, during precipitation and/or when strong winds prevail.
- Use only clean, potable water
- As with all cement based materials, avoid contact with aluminum to prevent adverse chemical reaction and possible product failure. Insulate potential areas of contact by coating aluminum bars, rails, posts etc. with an appropriate epoxy such as Sikadur®-32 Hi-Mod.
- Bonding agents (e.g. Sika® Armatec® 110 EpoCem) should not be used. Use of the neat mortar as a scrub coat is recommended and preferred. If bonding agents are used, follow cure times for the bonding agents used as a guide prior to putting SikaQuick®-1000 / SikaQuick®-1000 LD in service. Assure suitability with the manufacturer of the bonding agent.
- SikaQuick®-1000 / SikaQuick®-1000 LD does not form a vapor barrier when cured.

BASIS OF PRODUCT DATA

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OTHER RESTRICTIONS

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SIKA warrants this product for one year from date of installation to be free from manufacturing defects and to meet the technical properties on the current Product Data Sheet if used as directed within the product's shelf life. User determines suitability of product for intended use and assumes all risks. User's and/or buyer's sole remedy shall be limited to the purchase price or replacement of this product exclusive of any labor costs. **NO OTHER WARRANTIES EXPRESS OR IMPLIED SHALL APPLY INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR**

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BUILDING TRUST

PRODUCT DATA SHEET
SikaQuick®-1000

Rapid hardening repair mortar with extended working time

PRODUCT DESCRIPTION

SikaQuick®-1000 is a one-component, rapid hardening, early strength gain, cementitious, patching mortar for concrete. SikaQuick®-1000 LD is a low dust version of this formula.

USES

- On grade, above grade and below grade concrete conditions
- Highway overlays and repairs
- Structural repair material for concrete roadways, parking structures, bridges, dams and ramps
- Full depth patching repairs (may require multiple lifts)
- Economical patching material for horizontal flatwork repairs of mortar lines and concrete surfaces

CHARACTERISTICS / ADVANTAGES

- Specially suited for warmer weather applications when extended working time is required
- Epoxy coatings can be applied as early as 6 hours at 73° F (23° C).
- Freeze / thaw resistant
- Easy to use - labor-saving material
- Not gypsum-based
- High early strength
- Open to foot traffic in 4 hours / Open to vehicular traffic in 6 hours at 73° F (23° C)
- Easily applied to clean, sound substrates
- SikaQuick®-1000 LD is an available, low dust version of this product.

APPROVALS / STANDARDS

- Rapid hardening as defined by ASTM C 928

PRODUCT INFORMATION

Chemical Base	• SikaQuick®-1000 is a blend of cement, select aggregates and specialty additives • SikaQuick®-1000 LD is a blend of cement, select aggregates, low dust and specialty additives
Packaging	50 lb (22.7 kg) bag
Appearance / Color	Gray powder
Shelf Life	12 months from date of manufacture if stored properly in original, unopened and undamaged, sealed packaging
Storage Conditions	Store dry at 40° – 95° F (4° – 35° C) Protect from moisture. If damp, discard material

TECHNICAL INFORMATION

Florida Consulting Engineers, Inc.

Certificate of Authorization No. 5810
134 N.W. 16TH STREET, SUITE 1
BOCA RATON , FLORIDA 33432
PHONE: (561) 353-1152
E-MAIL: ZJ@FLCENGINEERS.COM

DATE	REVISIONS

ZUHAIR M. JALLOUL LICENSE No. 35416 STATE OF FLORIDA PROFESSIONAL ENGINEER

Zuhair M. Jalloul, P.E.
Fl. License. No.: 35416

DATE Nov. 18, 2021
SCALE AS SHOWN
DWNG. BY P.E.S.
CHECKED BY Z. JALLOUL
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall Balcony Concrete Repair

535 Park Ave,
Lake Park, FL 33403

CONCRETE REPAIRS PRODUCT SPECIFICATIONS

SHEET NUMBER
S-5
OF 6

BUILDING TRUST

PRODUCT DATA SHEET

Sikalastic®-710 NP Base

Single component, elastomeric, crack-bridging, primerless, waterproofing base coat

PRODUCT DESCRIPTION

Sikalastic®-710 NP Base is a single component, aromatic, moisture cured, elastomeric polyurethane coating intended for use as the waterproofing base coat under polyurethane or epoxy wearing surfaces for pedestrian and vehicular traffic bearing applications, and as the waterproofing base coat under a separate wearing course such as concrete, and tile in a setting bed. Sikalastic®-710 NP Base can be a direct replacement for Sikalastic® 710 in all applications.

USES

- Multi-story parking garages
- Parking decks and ramps
- Foot bridges and walkways
- Mechanical rooms
- Stadiums and arenas
- Plaza and rooftop decks
- Balconies
- Sikalastic®-710 NP Base can be used in the following systems:
  - Sikalastic®-710 NP Base/ Sikalastic®-715 Top
  - Sikalastic®-710 NP Base/Sikalastic®-715 Textured
  - Sikalastic®-710 NP Base/Sikalastic®-736 Textured

CHARACTERISTICS / ADVANTAGES

- Excellent crack-bridging properties and flexibility, even at low temperatures
- Primer not required for typical applications
- Resistant to water and deicing salts
- Alkaline resistant

PRODUCT INFORMATION

Packaging	5 gal. pails, 50 gal. (net) drums
Appearance / Color	Medium Gray
Shelf Life	1 year in original, unopened containers
Storage Conditions	Store dry at 40–95 °F (4–35 °C). Condition material to 65–85 °F (18–30 °C) before using.

Solid content by volume	71 %	(ASTM D-2697)
Volatile organic compound (VOC) content	240 g/L	(ASTM D-2369-81)
Viscosity	6500 ± 3000 cps	

TECHNICAL INFORMATION

Shore A Hardness	55 ± 5	(ASTM D-2240)
Tensile Strength	650 ± 100 psi	(ASTM D-412)
Elongation at Break	375 ± 50 %	(ASTM D-412)
Tear Strength	170 ± 25 pli	(Die C, ASTM D-624)
Chemical Resistance	Resistant to de-icing salts.	

APPLICATION INFORMATION

Coverage	50 ft²/gal. at 32 wet mils (23 dry mils). NOTE: Coverage rates provided are optimal and are not guaranteed. Coverage rates will vary depending on temperature, surface roughness and porosity, aggregate selection and embedment, and application technique.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Surface must be clean, dry and sound with an open texture. Remove dust, laitance, grease, curing compounds, bond inhibiting impregnations, waxes, and any other contaminants. All projections, rough spots, etc., should be dressed off to achieve a level surface prior to the application.
Concrete - Should be cleaned and prepared to achieve a laitance and contaminant free, open textured surface by blast cleaning or equivalent mechanical means. The use of a primerless-type base coat requires that the concrete surface be sufficiently prepared and open pored so that the base coat is able to penetrate the substrate surface and achieve an adequate bond. The desired surface texture (CSP 2-3 per ICRI Guidelines). In addition, the substrate surface must be thoroughly cleaned by blowing/vacuuming to remove all particulates that may interfere with base coat bonding. The base coat will not mix and consolidate dust and particulates as will some primers, so thorough cleaning is mandatory.
Plywood – Should be clean and smooth, APA and exterior grade, not less than ½" thick, and spaced and supported according to APA guidelines. Joints should be sealed with Sikaflex® 2c or 1a and detailed, and may need embedded fabric reinforcement.
Metal - Should be thoroughly cleaned by grinding or blast cleaning.

Detailing

Non-structural cracks up to 1/16 inch – Apply a detail coat of Sikalastic®-710 NP Base at 32 mils wet, 4" wide, centered over the crack. Allow to become tack free before overcoating.

Cracks and joints over 1/16 up to 1 inch – Seal previously routed and primed cracks and joints with Sika Sealant and allow to skin over and cure for 24 hours min. Apply a detail coat of Sikalastic®-710 NP Base at 32 mils wet, 4" wide, centered over the crack. Allow to become tack free before overcoating.

Joints over 1 inch – Should be treated as expansion joints and brought up through the Sikalastic® Traffic System and sealed with Sika sealant (see Sealant Guide).

Fabric Reinforcement – An optional 3" or 6" wide Sikalastic Flexitape Heavy fabric strip may be embedded within the base coat. Flexitape width shall be chosen such that a minimum of 1" tape is embedded on either side of the crack/joint. Apply additional coating as required to fully embed the Flexitape in the coating.

Panelized Joints – Panelized joints that are restrained across the joint and without differential movement may be sealed and the deck coating, including detail coat, applied over the joint.
NOTE: movement within panelized joints may cause deterioration of the aggregated wear coat, in which case the joints should be treated as expansion joints and brought up through the Sikalastic® Traffic System and sealed with Sika sealant .

Expansion Joints - Should be extended through System .

MIXING

Thoroughly mix coating using a mechanical mixer (jiffy) at slow speed until a homogenous mixture and uniform color is obtained (typically 1 minute). Use care not to allow the entrapment of air into the mixture.

APPLICATION

Apply at the recommended coverage rate (see Sikalastic® 710/715/735 AL System Guide) using a notched squeegee or trowel, and backroll using a phenolic resin core roller. Extend base coat over entire area including previously detailed cracks and joints. Allow coating to cure a minimum of 16 hours at 70 °F and 50 % RH or until tack fee before top coating. Allow coating to cure for a minimum of 72 hours before installing separate concrete pavement or tile wear course.

Removal
Remove liquid coating immediately with dry cloth. Once cured, coating can only be removed by mechanical means.

LIMITATIONS

- To avoid dew point conditions during application relative humidity must be no more than 95 % and substrate temperature must be at least 5 °F (3 °C) above measured dew point temperature.
- Maximum moisture content of concrete substrate by weight when measured with a Tramex CME is 4% .
- Minimum ambient and substrate temperature during application and curing of material is 40 °F (4 °C); maximum is 95 °F (35 °C).
- Do not store materials outdoors directly exposed to sunlight and moisture. Cover and protect materials with breathable type covers such as canvas tarpaulins to allow venting and protection from weather and moisture. Observe temperature storage and conditioning requirements.
- Do not thin with solvents.
- Minimum age of concrete must be 21–28 days, depending on curing and drying conditions.
- Any repairs required to achieve a level surface must be performed prior to application (consult a Sika representative for guidance on various product solutions). Surface irregularities may reflect through the cured system.
- Do not apply to a porous or damp surface where moisture vapor transmission will occur during application and cure.
- Substrate must be dry prior to application. Do not apply to a frosted, wet or damp surface. Do not proceed if rain is imminent within 8–12 hours of application. Allow sufficient time for the substrate to dry after rain or inclement weather as there is the potential for bonding problems.
- When applying over existing coatings compatibility and adhesion testing is recommended.
- Precautions should be taken to prevent odors and/or vapors from entering the building/structure, including but not limited to turning off and sealing air intake vents or other means of ingress for odors and for vapors into the building/structure during product application and cure.
- On grade, lightweight concrete, asphalt pavement, or insulated split slab applications, or applications where chained or studded tires may be used, must not be coated with Sikalastic Traffic Systems without Sika technical review. Contact Sika Technical Services/Product Engineering
- Unvented metal pan decks or decks containing a between-slab membrane require further technical evaluation and priming with a moisture-tolerant primer - contact Sika regarding recommendations.
- Waterproofing applications under overburden, including concrete pavement, and tile in a cementitious setting bed, require further technical evaluation - contact Sika regarding recommendations.
- Do not subject to continuous immersion or ponding water.
- Sikalastic® 710 NP is not UV stable and must be top coated or protected by a separate wearing course.
- Primer coat must be kept clean and recoated within 48 hours. If this window is exceeded, contact Sika for recommendations.
- Mockups to verify application methods and substrate conditions as well as desired skid resistance and aesthetics are highly recommended.
- Cracks or ruptures which develop in the structure after the waterproofing traffic system has been installed will not be bridged by the waterproofing traffic system and need to be repaired according to the recommended standard crack treatment details per this PDS.

BASIS OF PRODUCT DATA

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OTHER RESTRICTIONS

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BUILDING TRUST

PRODUCT DATA SHEET

Sikalastic®-715 LoVOC Textured

Single component, integrally textured, elastomeric, low-VOC, wear and top coat

PRODUCT DESCRIPTION

Sikalastic®-715 LoVOC Textured is a single component, UV-resistant, aromatic, moisture cured, low VOC elastomeric polyurethane coating intended for use as the wear and top coat over polyurethane waterproofing membrane for pedestrian and vehicular traffic bearing applications, and as a protective top coat over polyurethane waterproofing membrane under a separate wearing course such as concrete, and tile in a setting bed.

USES

Sikalastic®-715 LoVOC Textured may only be used by experienced professionals.

- Multi-story parking garages
- Parking decks and ramps
- Foot bridges and walkways
- Mechanical rooms
- Stadiums and arenas
- Plaza and rooftop decks
- Balconies

CHARACTERISTICS / ADVANTAGES

- Low VOC - California Compliant
- Fast turnaround with optional Booster
- Excellent crack-bridging properties and flexibility, even at low temperatures
- Outstanding resistance to abrasion and wear
- Resistant to water and deicing salts
- Alkaline resistant
- UV resistant
- Range of standard colors

PRODUCT INFORMATION

Packaging	4.75 gal. in 5 gal. pails
Appearance / Color	Gray, Charcoal and Tan
Shelf Life	12 months in original, unopened containers
Storage Conditions	Store dry at 40–95 °F (4–35 °C). Condition material to 65–85 °F (18–30 °C) before using.

Solid content by volume	**715 Lo-VOC T w/o Booster** 86.5 %	**715 Lo-VOC T w/ Booster** 86.5 %	(ASTM D-2697)
Volatile organic compound (VOC) content	**715 Lo-VOC T w/o Booster** 98.8 g/L	**715 Lo-VOC T w/ Booster** 93.8 g/L	(ASTM D-2369-81)
Viscosity	**715 Lo-VOC T w/o Booster** 7000 ± 2000 cps	**715 Lo-VOC T w/ Booster** 7000 ± 2000 cps	

TECHNICAL INFORMATION

Shore A Hardness	**715 Lo-VOC T w/o Booster** 85 ± 5	**715 Lo-VOC T w/ Booster** 80 ± 5	(ASTM D-2240) 75 °F (24 °C) 50 % R.H. non seeded film
Tensile Strength	**715 Lo-VOC T w/o Booster** 3400 ± 300 psi	**715 Lo-VOC T w/ Booster** 3400 ± 300 psi	(ASTM D-412) 75 °F (24 °C) 50 % R.H. non seeded film
Elongation at Break	**715 Lo-VOC T w/o Booster** 450 ± 50 %	**715 Lo-VOC T w/ Booster** 250 ± 50 %	(ASTM D-412) 75 °F (24 °C) 50 % R.H. non seeded film
Tear Strength	**715 Lo-VOC T w/o Booster** 300 ± 50 pli	**715 Lo-VOC T w/ Booster** 300 ± 50 pli	non seeded film
Chemical Resistance	Resistant to deicing salts, and alkaline concrete and cementitious mortars/tile adhesives		

APPLICATION INFORMATION

Coverage	70 sf/gal at 16 wet mils (14 dry mils) 60 sf/gal at 18 wet mils (16 dry mils) 53 sf/gal at 20 wet mils (18 dry mils) Coverage rates provided are intended to achieve required wet film thickness under optimal conditions. Additional material may be required depending on substrate surface roughness and porosity, material, substrate and air temperatures, and other site-dependent factors. This will result in a lower coverage rate.

APPLICATION INSTRUCTIONS

SURFACE PREPARATION

Surface must be clean, dry and sound with an open texture. Remove dust, laitance, grease, curing compounds, bond inhibiting impregnations, waxes, and any other contaminants. All projections, rough spots, etc. should be dressed off to achieve a level surface prior to the application.

Sikalastic® 710 Base Lo-VOC Waterproofing Base Coat - Coating should be cured and tack free.

Existing Coatings - Should be cleaned and mechanically abraded to provide a contaminant free, open textured surface. Solvent wipe as allowed by state and local regulations. Use Sikalastic® Recoat Primer .

MIXING

Thoroughly mix Sikalastic®-715 LoVOC Textured for 3 minutes using a mechanical mixer (Jiffy) at slow speed until a homogenous mixture and uniform color is obtained . Make sure to scrape the solids and the aggregate from the bottom and sides of the pail. The aggregate should be evenly diffused in the resin. Use care not to allow the entrapment of air into the mixture.

APPLICATION

Wear coat: Apply at the recommended coverage rate 18 mils wet (60 sf/gal) using a 1/8" or 3/16" notched squeegee or trowel, and backroll using nap roller 3/8" to uniformly backroll prior to applying topcoat. It should be backrolled two times, one perpendicular to the other.

Top coat: Apply at the recommended coverage rate 18 mils wet (60 sf/gal) using a 1/8" or 3/16" notched squeegee or trowel, and backroll using nap roller 3/8" to uniformly backroll. The Top coat should be backrolled two times, one perpendicular to the other. Allow coating to cure a minimum of 4 hours at 70 °F and 50 % R.H.; coating must be tack free before overcoating. Allow coating to cure for a minimum of 36 hours before opening to vehicular traffic

Booster - Sikalastic® 715 Top Lo-VOC Booster may be added to Sikalastic®-715 LoVOC Textured in order to speed cure time. Mix thoroughly prior to application. Add a maximum of 1 quart to 4.75 gallons (or 1:19 ratio) and only to material that will be applied within 1 hour. Allow coating with booster to cure a minimum of 6 hours at 70 °F and 50 % R.H. or until tack fee between coats. Allow coating to cure for a minimum of 36 hours before opening to vehicular traffic or installing separate wear course.

Removal
Remove liquid coating immediately with dry cloth. Once cured, coating can only be removed by mechanical means.

MAINTENANCE

Clean with non-sudsing detergent and water and inspect regularly for mechanical damage. Snow removal equipment must have shoes, rubber tips or small skis to prevent ruptures. The use of metal blades without protection is not recommended. Damaged areas should be repaired promptly. Remove delaminated coating back to well adhered material and reinstall patch according to procedures described above. Do not use asphalt or tar modified products. Consult a Sika representative for recommendations on top coat or wearing surface restoration.

LIMITATIONS

- To avoid dew point conditions during application relative humidity must be no more than 95 % and sub strate temperature must be at least 5 °F (3 °C) above measured dew point temperature.
- Minimum ambient and substrate temperature during application and curing of material is 50 °F (10 °C); maximum is 95 °F (35 °C).
- Do not store materials outdoors directly exposed to sunlight and moisture. Cover and protect materials with breathable type covers.
- Do not thin with solvents.
- Minimum age of concrete must be 21–28 days, depending on curing and drying conditions.
- Any repairs required to achieve a level surface must be performed prior to application (consult a Sika Representative for guidance on various product solutions). Surface irregularities may reflect through the cured system.
- Do not apply to a porous or damp surface where moisture vapor transmission will occur during application and cure.
- Substrate must be dry prior to application. Do not apply to a frosted, wet or damp surface. Do not proceed if rain is imminent within 8-12 hours of application. Allow sufficient time for the substrate to dry after rain or inclement weather as there is the potential for bonding problems.
- When applying over existing coatings compatibility and adhesion testing is recommended.
- Precautions should be taken to prevent odors and/or vapors from entering the building/structure, including but not limited to turning off and sealing air intake vents or other means of ingress for odors and for vapors into the building/structure during product application and cure.
- Opening to vehicles/pedestrians or installation of separate wear course prior to final cure may result in loss of aggregate, or permanent staining and subsequent premature failure.
- Vehicle fluids and some high performance tires can stain the coating. Fluid spills should be removed promptly as the coating can in some cases be damaged from prolonged exposure.
- On grade, lightweight concrete, asphalt pavement, or insulated split slab applications, or applications where chained or studded tires may be used should not be coated with Sikalastic® Traffic Systems.
- Unvented metal pan decks or decks containing a between-slab membrane require further technical evaluation and priming with a moisture-tolerant primer - contact Sika regarding recommendations.
- Waterproofing applications under overburden, including concrete pavement, and tile in a cementitious setting bed, require further technical evaluation - contact Sika regarding recommendations.
- Do not subject to continuous immersion.
- Sikalastic®-715 LoVOC Textured is UV resistant, but will chalk, fade or discolor over time when exposed to UV and under certain artificial lighting conditions. Sikalastic® 736 AL Lo-VOC aliphatic top coat provides superior color and gloss retention.
- Base and intermediate coats must be kept clean and re-coated within 48 hours, or 24 hours if Accelerator or Boosters are used.
- Mockups to verify application methods and substrate conditions as well as desired skid resistance and aesthetics are highly recommended.

BASIS OF PRODUCT DATA

Results may differ based upon statistical variations depending upon mixing methods and equipment, temperature, application methods, test methods, actual site conditions and curing conditions.

OTHER RESTRICTIONS

See Legal Disclaimer.

ENVIRONMENTAL, HEALTH AND SAFETY

For further information and advice regarding transportation, handling, storage and disposal of chemical products, user should refer to the actual Safety Data Sheets containing physical, environmental, toxicological and other safety related data. User must read the current actual Safety Data Sheets before using any products. In case of an emergency, call CHEMTREC at 1-800-424-9300, International 703-527-3887.

LEGAL DISCLAIMER

• KEEP CONTAINER TIGHTLY CLOSED
• KEEP OUT OF REACH OF CHILDREN
• NOT FOR INTERNAL CONSUMPTION
• FOR INDUSTRIAL USE ONLY
• FOR PROFESSIONAL USE ONLY

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This item has been digitally signed and sealed by Zuhair Jalloul, PE, on Nov 30, 2021.
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Florida Consulting Engineers, Inc.

Certificate of Authorization No. 5810

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PROFESSIONAL ENGINEER

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DATE Nov. 18, 2021
SCALE AS SHOWN
DWNG. BY P.E.S.
CHECKED BY Z. JALLOUL
PROJECT NO. 211104
DRAWING FILE ----

Lake Park Town Hall
Balcony Concrete
Repair

535 Park Ave,
Lake Park, FL 33403

CONCRETE
REPAIRS PRODUCT
SPECIFICATIONS

SHEET NUMBER
S-6
OF 6